Light and Lighting

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CONTENTS

	Page
Editorial	215
Notes and News	216
I.E.S. Summer Meeting, Southport	219
Lighting Equipment at Southport	230
Association Française des Eclairagistes at Monaco	237
Annual Meeting of the Lichttechnische Gesellschaft	242
Lighting Abstracts	245
Correspondence	
Flameproof Lighting Equipment (J. M. Waldram, D. A. Strachan)	246
Postscript, by "Lumeritas"	248
Index to Advertisers	xiv

Lights and Rights

THE latest of the "rights of man" to become conditional upon lights is the right of precedence which, since July 1, belongs to pedestrians who wish to traverse certain straight and narrow paths across the public carriageways. This priority of passage can be claimed—either by day or night—only when at least two beacons are alight to mark the terminals of the cross-way, and only when there is no policeman temporarily controlling the traffic at the beaconed crossing. It would be dangerous to give one class of road-user a right which another class could not respect for want of effective indication of where it is likely to be exercised, and so it is entirely proper that the right in question should be dependent upon indicator lights. It is to be hoped, however, that pedestrians will clearly understand that the primary purpose of the beacons is to indicate the presence of a crossing and not to illuminate people on, or about to use, it. By night, the approach of a road vehicle may be more apparent to the pedestrian than the latter is to the vehicle-driver. It is the duty of vehicle-drivers to approach beaconed crossings with eyes agog and prepared to stop if given a reasonable chance to do so. It is the duty of pedestrians to bear in mind that beacons cannot be automatic and super brakes. It is also the duty of local authorities to maintain the lights to maintain the rights.

Notes and News

Report of the Royal Fine Art Commission

One would expect the annual report of the Royal Fine Art Commission to include something on the subject of street lighting columns, particularly now that John Betjeman is a member of the Commission. Indeed one would be disappointed if the R.F.A.C. omitted to mention the subject in its report; street lighting engineers are in sympathy with the objects of the Commission and are anxious that street lighting should be an amenity in all respects.

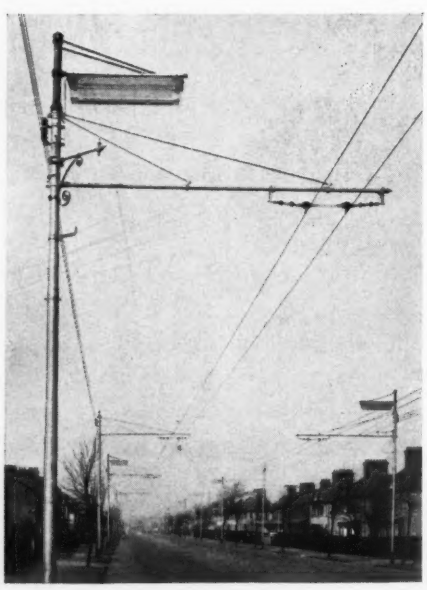
The section on street lighting, in a report which in any case is very brief (perhaps too brief), might be quoted in full. It reads: "One development which affects both town and country and which continues to give the Commission great concern is the new street lighting. Reference has been made in earlier Reports to the damage being done to many towns and villages by the erection of lamp-posts that are out of scale and out of character with the surroundings. In some of the more important cases the Commission has been able to advise the Lighting Authority direct, but the situation remains profoundly disturbing and calls for constant vigilance on the part of local amenity societies. With the easing of the steel supply position and the development of improved types of standard, encouraged by the Council of Industrial Design, it should seldom be necessary any longer to make use of the heavier concrete columns and brackets that were introduced immediately after the war. In many cases, too, the scale of the buildings calls for a reduction in height below the 25 ft. required by current regulations and here further technical research should be undertaken as a matter of urgency to enable the necessary standard of illumination to be maintained with shorter lamp-posts."

We wonder whether it is because of the brevity of the Report or because the Commission does not include a lighting engineer amongst its members that the Report contains a somewhat misleading statement. There are no "current regulations" requiring a mounting height of 25 ft. Recommendations and Codes of Practice are not regulations; if any local authority wishes to use a lower mounting height then it is at liberty to do so—though if a Ministry of Transport grant is expected then no doubt the Ministry would insist on 25 ft. The decision to adopt the 25 ft. mounting height was not taken without careful and prolonged thought. A lighting engineer on the Commission would have advised that shorter mounting height means shorter spacing—and more columns.

It's a pity that the Report makes no reference to the trend to mount lanterns on buildings. There have been several installations during recent years the most recent being that in Aberdeen. The latter installation seems to have worried some architects who are afraid that the idea might spread; they warn their colleagues to keep a sharp look-out or "some horrors may be perpetrated." Fortunately street lighting fittings are smaller than buildings.

Talking about "horrors," we wonder what the R.F.A.C. would have to say about the installations illustrated here. We say "installations" because the street lighting part is only an addendum to what was already there. We have no doubt that the street lighting is as good as it can be in the circumstances, but street lighting engineers are not happy when they have to be associated with jobs which are so aesthetically disagreeable.

One last word on the annual report of the R.F.A.C. What does it mean by "the new street lighting"? Are we so close to it that we cannot see what is going on?



The Television Centre

Some time ago we heard of plans to build a wonderful new television centre at White City. Until quite recently we imagined that the plans still existed only on paper and were surprised when we received an invitation to visit the site and see for ourselves how far work has progressed. The project is a big one, and so far only one block of the group of buildings has been finished. This is what will be the scenery block where all the sets will be made and stored. Most of the block is office accommodation where the designers and top executives work.

We noticed that though it was one of our rare sunny days the lights in most offices, and certainly in all the corridors, were in use. The lighting is by tungsten lamps throughout. We asked why fluorescent lighting had not been used; if lights are in use all day then it is certainly justified on economic grounds alone. The answer received was that the B.B.C. thought fluorescent lighting bad for the eyes and had instructed the architects and engineers to use tungsten lighting. The B.B.C. can use whatever form of lighting takes their fancy, but we cannot believe that their decision to use tungsten lighting was based on such a falacy. One has a certain amount of patience with uninformed individuals who swallow any propaganda that is put to them, but for the B.B.C. or any other large organisation to believe such poppycock would be indefensible. We hope the reason we were given is the wrong one, in which case it would be interesting to know the true reason.

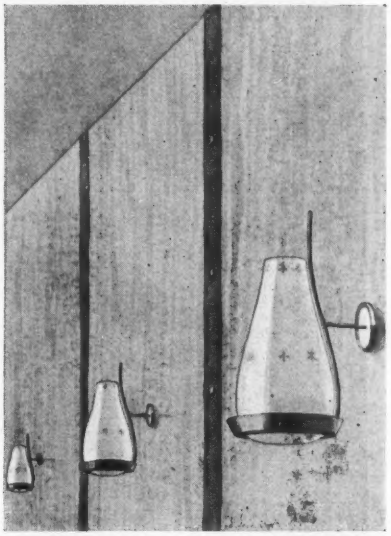
One word of praise. Those who like neither contemporary furniture nor contemporary lighting fittings should seek audience with the Director of Television, whose office is the best example we have yet seen of the use of both.

R.S.A. Industrial Arts Bursaries Competitions

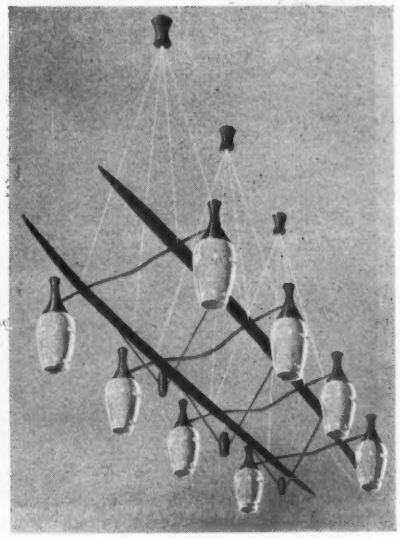
The results of the 1953 Industrial Arts Bursaries Competitions and the conditions of the 1954 competitions were announced by the Royal Society of Arts some time ago, and we are at fault for not having drawn attention to them earlier.

Mr. A. G. Penny drew attention to the competition for electric light fittings in our January issue, pointing out that there are not many opportunities for young designers of lighting fittings to win £150. Perhaps the lighting industry is not training any young designers; the number of candidates for the 1953 bursary dropped to only six, a cause of disappointment to the jury and a sad reflection on the industry. The 1953 prize was carried off by Mr. J. C. K. Hardaker, aged 19, of the Birmingham College of Art and Crafts. As candidates between the ages of 17 and 30 are eligible, Mr. Hardaker is to be doubly congratulated.

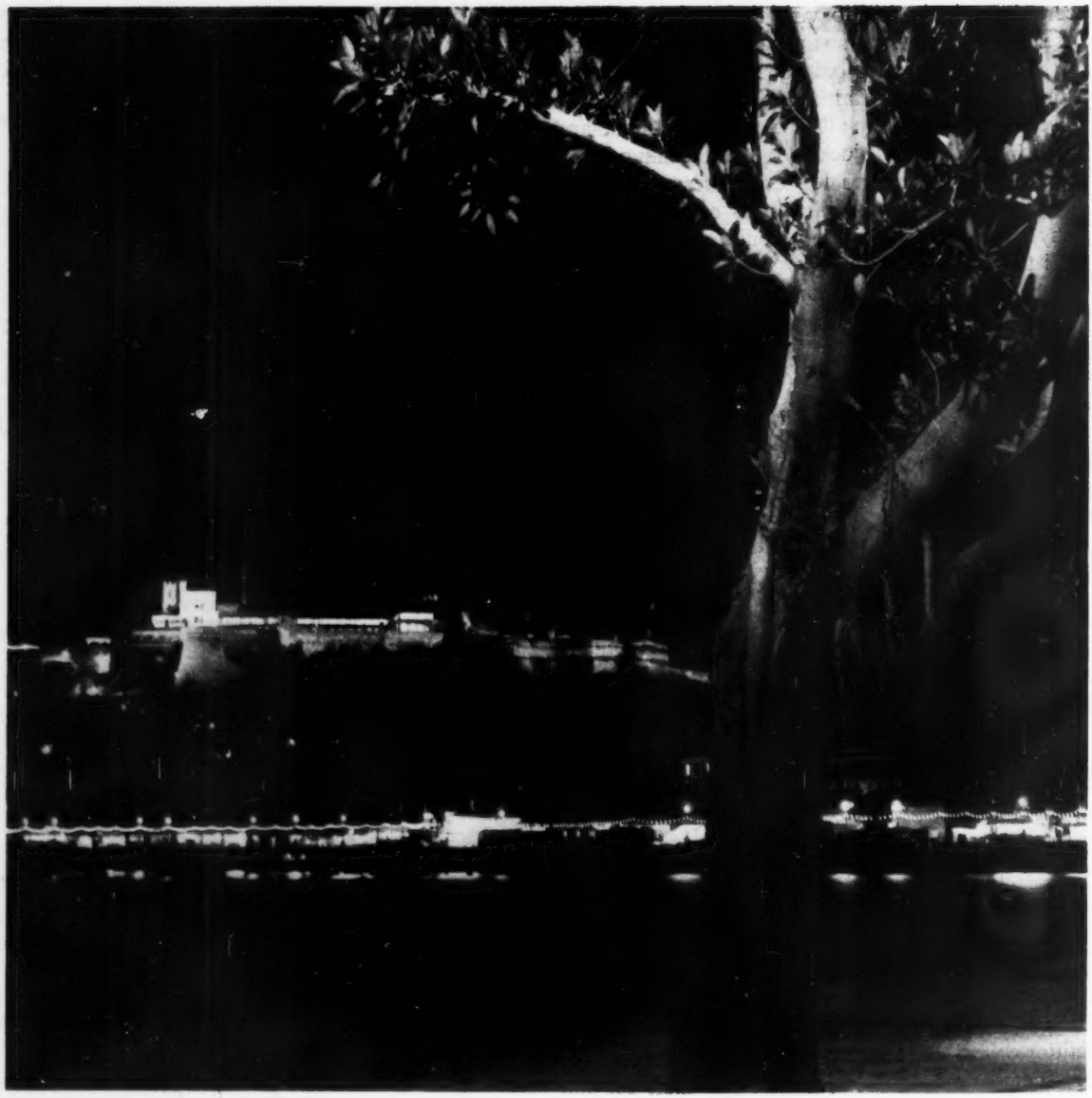
Details of the 1954 bursaries are now available from the Royal Society of Arts. In brief they are open to full-time, part-time or evening class students who intend taking up industrial design as a career. Entry forms have to be returned to the R.S.A. by October 11. There is a set test and in addition candidates have to submit examples of their work —in the case of the electric-light fittings section, three designs showing perspective and typical working details for fittings suitable for use in the home (using tungsten lamps), in offices, shops or showrooms (using fluorescent lamps). The set test last year was the design of lighting fittings for a board-room; two of the designs submitted in this section are reproduced on this page.



Wall lights for a board - room (J. C. K. Hardaker).



Fitting suspended over board-room table (B. Eccleston).



Monte Carlo, venue of the 1954 meeting of the Association Française des Eclairagistes.

I.E.S. Summer Meeting, Southport

W. R. Stevens, President.

The fourth biennial Summer Meeting of the Illuminating Engineering Society took place at Southport under the presidency of Mr. W. R. Stevens from May 18 to 21. The high standard set by previous such meetings was well maintained, all the technical sessions and social events being very well attended.

Many of those taking part in the meeting took advantage of the opportunity given to visit factories and installations in Liverpool on the Tuesday on their way to Southport. Three visits were arranged—to the Tate and Lyle Sugar Refinery, to the Speke factory of the Dunlop Rubber Company, and to the electrical and mechanical installations at the Mersey Tunnel.

On the Tuesday evening delegates were entertained by the Mayor and Mayoress of Southport (Alderman and Mrs. W. Tattersall) at a civic reception. The entertainment and hospitality given to the Society was greatly appreciated. During the course of the evening the Mayor officially welcomed the Society to Southport, adding a nice touch by addressing a few remarks to the number of visitors from Norway in their own language.

In the unavoidable absence of the Mayor of Southport, the Summer Meeting was opened on Wednesday morning, May 19, by the President, who said that the attendance, approximately 450, was by far the largest in the history of the Society. Especially he welcomed a large number of visitors from no less than 10 countries overseas, *viz.*, Belgium, Denmark, Eire, Finland, France, Holland, India, New Zealand, Norway and the United States.

Cordial greetings from the Association Française des Eclairagistes were brought by M. Henri Maisonneuve. He mentioned that a meeting of the A.F.E. was to be held this year in Monte Carlo, and anyone present who could attend was warmly invited to do so.

Lamps, Common and Uncommon

The opening ceremony was immediately followed by the first technical session, at which the chair was taken by Mr. H. G. Campbell, Vice-President. Dr. Aldington presented his paper "Lamps and their Uses" in his usual polished and yet carefree style, with a wealth of ingeniously devised and faultless demonstration.

He began by saying that, while the range of adaptability of the human body to changes of temperature was very small, that of the eye to differences of illumination was enormous. In consequence, while we were willing to pay heavily for heating our premises, we were only too apt to abuse our eyes by requiring them to work under unsuitable conditions, and he felt that illuminating engineers should not rest content until the importance of proper lighting was as universally recognised as, say, the need for comfortable temperature conditions.

In his paper Dr. Aldington pointed out that during the past 25 years, advances in light sources had been greater than in any other similar period since primitive times. In fact, the development of the electric lamp had outstripped advances in methods of using it. However, there were now definite signs that this period of intense inventive activity was merging into a period of consolidation in which advances would be less spectacular and would mainly take the form of improvements in existing types of lamps. Mentioning electro-luminescence, in which a phosphor emitted light when subjected to an alternating electrical stress at high frequency, he said that he did not think this had any potentialities as a practical light source.

Dr. Aldington then took some outstanding examples of lamps developed to fill definite user requirements. He first mentioned the automobile headlamp and in particular the pre-focus headlamp bulb with two filaments, one of which gave a "driving" beam and the other a "dipped" or "passing" beam. The difference was clearly shown on a screen.

Next came a reference to different types of lamps used for projection, particularly the "solid source" filament, which also was demonstrated. In the paper there was a description of a special projector lamp with its filament close to the bulb, so as to enable the optical system to collect the maximum amount of the emitted light.

Two high wattage lamps came in for special mention. One of these was the lighthouse lamp, rated at from 1 to 10 kw., the other was a quick nigrescence lamp used for

morse signalling over long distances. To overcome the sluggishness of a thick filament with its high thermal capacity, a number of thin filaments are mounted in parallel so that the total wattage is high, but the cooling rate sufficiently fast to allow of signalling at a moderate speed.

Dr. Aldington then passed from the tungsten lamp to the gas discharge lamp. He described the type of xenon lamp used for giving intermittent flashes of very brief duration and very high intensity. A high current density gas discharge lamp designed for continuous operation, the gas arc, was receiving increasing attention and seemed to have a number of interesting applications.

On the subject of metal vapour discharge lamps, Dr. Aldington paid tribute to the work of the British lamp research laboratories which, he said, had led the world in the production of types of mercury vapour lamps, of which there were now an astonishingly large number available to the illuminating engineer.

The final section of the paper was devoted to the hot cathode fluorescent lamp and Dr. Aldington showed an array of such lamps to demonstrate the almost limitless range of colours obtainable in this source. This was, in a sense, an embarrassment. In the case of the tungsten lamp the user had to accept the colour which resulted from the definite relationship between colour temperature and efficiency and life. With the fluorescent lamp, however, the colour was almost infinitely variable and it was very difficult for the lamp maker to find out what the user wanted. Lamps had therefore been designed to fill broadly a number of different fields of use. Dr. Aldington expressed the opinion that the time was not yet ripe for a standardisation of the colours of fluorescent lamps. Development was still taking place and by standardising prematurely, progress might be impeded.

Mr. W. J. Jones opened the discussion by recalling some demonstrations of fluorescent effects shown many years ago by the first President of the Society, Prof. Silvanus Thompson. He said that he hoped users would take to heart what Dr. Aldington had said and, instead of asking for something special, would examine what was already available and see if their requirements could not be met by one of the 10,000 different types of lamps now being produced. He urged that the international bodies concerned with the automobile headlamp, the C.I.E., the International Electrotechnical Commission and the International Standards Organisation, should as soon as possible arrive at some unification of the automobile headlamp bulb. With regard to the colours of fluorescent lamps, he said that to defer standardisation too long was to run the risk that different national standards would be set up in different countries.

Dr. J. W. Strange thought that the most practical plan was to approach standardisation by first agreeing on fairly wide limits. These could then be reduced from time to time as more experience was obtained. He disagreed with Dr. Aldington about the potentialities of electro-luminescence as a light source and referred to the large amount of research which was being devoted to studying it. He asked if the author had anything to say about the zirconium arc.

Dr. Wellwood Ferguson endorsed the author's plea that the eye should be provided with working conditions that were as comfortable as possible. Dr. R. G. Hopkinson said that it was claimed for the new Deluxe Warm White lamps that they gave a closer approximation to the colour of the tungsten filament lamp. Did Dr. Aldington think that, philosophically, this was a sound approach?

Mr. W. Gilchrist said that there was a general impression that good lighting was expensive and this ought to be dispelled. He knew of local authorities who were actually paying less for their street lighting than before the war. He suggested a reduction in the number of the lower watt ratings of general service tungsten lamps.

In his reply, Dr. Aldington maintained that electroluminescence was more a tool for the research worker in his study of the behaviour of phosphors than a practical method of producing light economically. The zirconium arc was interesting as a very small source of high intensity. To Dr. Hopkinson's question he gave a purely personal reply in the negative. He was convinced that sources whose colour did not lie on the black body locus, but definitely on the purple side of it, had a high degree of acceptability. As regards the reduction suggested by Mr. Gilchrist, with his tongue in his cheek he said that if the illuminating engineers would agree to this, the lamp makers would be pleased to give it careful consideration.

During the Wednesday morning the ladies took coffee with Mrs. Stevens at the Palace Hotel. During the afternoon the ladies visited Knowsley Hall.

Street Lighting

The afternoon session on Wednesday was in two parts. At the first, under the chairmanship of Mr. W. Gilchrist, Chairman of the Liverpool Centre, Mr. A. T. Durbridge, of the Eastern Electricity Board, read a paper entitled "Street Lighting in a Large London Suburb." The suburb of the title was the then urban district, now the borough, of Harrow and Wealdstone, a dormitory of London which in recent years has had a phenomenal growth from a comparatively small country town to a vast built-up area with a population approaching a quarter of a million. There are, in the borough, 44 miles of M.O.T. classified roads and 180 miles of unclassified roads, and there are nine well-defined shopping centres but no real "town centre." The pre-war lighting system was naturally quite inadequate for the post-war needs of this vast town and in 1946 and following years the Harrow Council held conferences with neighbouring local authorities so that some degree of uniformity might be secured over as large an area as possible when new street lighting was installed. As a result minimum standards of illumination were agreed but the method of achieving these was left to each local authority to work out independently. These standards were 5,000 lumens per 100 ft. for Group "A" (traffic routes) and 2,000 for Group "B," i.e., near the upper end of the range recommended by the Departmental Committee.

In addition to these conferences, members of the Highways Committee of the Council made numerous inspections of all types of lighting in nearby districts and elsewhere, while four firms specialising in street lighting equipment erected trial installations of fluorescent lighting in four different shopping centres.

As a result of all this preliminary work the Council in 1949 adopted a five-year programme for the re-lighting of the whole area, recommending that fluorescent lighting should be adopted for all Group "A" roads and sodium lighting for Group "B." The total cost was estimated at £376,000. For financial reasons the Council was forced

to modify this programme and in consequence fluorescent lighting was restricted to shopping centres, the remainder of the Group "A" lighting being by 140-watt sodium lamps. So far the first- and second-year programmes have been completed, while the third-year programme is now being undertaken and will bring the total number of units up to 116 fluorescent (in the principal shopping areas) and 913 sodium (140-watt). The author estimated that, at the present rate, the re-lighting of all the Group "A" roads would not be completed until 1958, and then there would still be the 180 miles of unclassified roads to be brought up to Group "B" standard.

Mr. Durbridge gave a number of interesting details regarding the design of the installation, capital and running costs and maintenance. He said that few of the roads were straight and it had often been found necessary to reduce the spacing of the lamps to well below that permitted in the Code of Practice; one important traffic route needed an average of 57 lanterns per mile. Cross-roads in residential areas, where the lighting was still by gas, were marked by four 45-60-watt sodium lanterns placed in the positions recommended in the Code, and this had proved very valuable for warning approaching traffic of the proximity of a road junction.

The maintenance of the system, said the author, was carried out by the Electricity Board. Lamp replacement was done according to a routine schedule. Although the atmosphere of Harrow was by no means free from dirt, a satisfactory standard of cleanliness could be achieved with four cleanings per annum. In his reply to the discussion he made it clear that this was not the same thing as one cleaning every three months; they aimed at three cleanings during the dirtier period of the year and one cleaning during the clean period, using one of the soapless detergents. Inspection was made weekly.

The author emphasised in his paper the need for taking care that sodium lamps were tilted downwards by about 2 deg. and he later mentioned the need for an adjustment to enable this tilt to be maintained. If this was done, and if the transformer tapping appropriate to the voltage on each individual lamp service terminal was selected, there was little or no trouble with premature failures or with failure to strike. The totally enclosed fittings used gave every satisfaction.

Finally Mr. Durbridge mentioned the need to avoid possible confusion with railway signal lights and he added that, as Harrow approached Northolt airport, screening had to be provided in certain parts of the area. A modified form of cut-off lantern, giving satisfactory street lighting at a spacing of 120 ft. and yet satisfactory to the Air Ministry, was used.

The discussion on Mr. Durbridge's paper was opened by Mr. C. C. Smith, the President of the A.P.L.E. and City Lighting Engineer of Liverpool. He commended the action taken by Harrow in consulting their neighbours before planning their street lighting and he hoped that other authorities would follow their example. At the same time, he would not like to see a dull uniformity. He felt that the best plan was for the authorities to agree on the standard of lighting to be provided and then for each to adopt its own method for achieving this standard.

He did not agree with the implication that sodium lighting was unsatisfactory for a shopping area. If the shop window lighting was of a reasonable standard, a centrally suspended system of sodium lighting was quite good. The criticism often levelled at central suspension, *viz.*, that it was more expensive because of the closer spacing required, was not really justified and he quoted Mr. Durbridge's figures for a side mounted system to justify his contention.

Mr. J. M. Waldram, who lives in Harrow, said that the idea of having one kind of lighting for ordinary highways and another for a shopping centre was an excellent one. It emphasised the nature of the area as something different. He thought that in some cases there had been a tendency to place lamps on the outside of a bend which was really too slight to warrant this treatment.

Mr. F. H. Pulvermacher, of Cardiff, referred to a 20-mile stretch of roadway which was to be lighted to a uniform standard by agreement between the local authorities concerned, although each would use the lanterns and equipment it liked best. He asked if there had been any trouble at Harrow with fracture of the tops of concrete columns stressed by oscillatory movements of the lanterns due to windage. He put the life of sodium lamps at 5,000 hours and asked the author's opinion.

Mr. Durbridge, replying to various points raised during the discussion, said that the concrete columns used were not prestressed. The fluorescent lamps in the shopping centres were operated horizontally. He mentioned that the paper had been prepared some months earlier so that the map showing the re-lighted streets was somewhat out of date. With regard to the lives of the various sources he estimated 900 to 1,000 hours for tungsten, 2,500 to 2,750 for sodium and 3,000 for fluorescent.

Lighting for Horticulture

After an adjournment for tea, the second part of the afternoon session was held under the chairmanship of Mr. A. H. Owen, Vice-President. A paper entitled "Artificial Lighting for Plant Growth" was read by Mr. A. E. Canham, of the Electrical Research Association, who took as his starting point the report on the subject published by the Association in 1946.

He first spoke about the difficulties met with in finding a suitable basis for the measurement of the irradiation. The response of a plant to equal amounts of energy at different wave-lengths was, naturally, unlike that of the eye, so that measurements could not be satisfactorily expressed in lumens. Further, the response curve had not been well established and it probably differed somewhat from one plant to another, with the result that the most satisfactory plan was to measure the radiation in energy units, such as milliwatts per square metre, and give the spectral distribution curve of the light. Some workers had determined the relationship between the reading on a photo-electric photometer, scaled in lumens, and the corresponding energy per square metre for different light sources.

Although the relation between wave-length of radiation and rate of growth was open to considerable uncertainty, it could be said definitely that red light produced the most rapid growth but a badly shaped plant, while blue light produced a plant of normal shape but the growth was very slow. On the whole, white light was the most satisfactory for promoting growth without spoiling the shape of the plant. The illumination values required were of the order of 1,000 to 2,000 lm./ft.^{2} and it was only the coming of the fluorescent lamp, said Mr. Canham, that had made possible the use

of this amount of artificial light without harm from excessive heating. He mentioned by name a number of installations at different research institutions, both at home and abroad.

The next subject dealt with was supplementary lighting, i.e., lighting used to lengthen the natural day. Here the use of mercury discharge lamps was advocated by the author and he showed examples of the effect of supplementary lighting on tomato seedlings. The day could usefully be lengthened in this way to a total of 17 to 18 hours but it was essential that the plants should have six to seven hours of darkness in each 24-hour period. For economic reasons it was frequently arranged that after 10 hours over one batch of plants the lamps were moved to a second batch, so that the load factor of the installation could be improved.

The effect of light on the flowering time of plants, said the author, was very interesting. Some plants, such as late flowering chrysanthemums, were "short-day" plants and would not flower so long as they were subjected to long periods of illumination. Other plants were "long-day" plants for which the reverse was true. Yet others were indifferent. The control of the flowering time by regulating the length of the day artificially clearly offered great commercial possibilities and it had, in fact, been used with considerable success. The illumination required, said Mr. Canham, was quite low, 5 to 10 lm./ft.^{2} being sufficient. An alternative to lengthening the day was to interrupt the night with an illumination of some 10 to 15 lm./ft.^{2} for about two hours at midnight. Photo-period control could also be used, he said, in plant breeding to speed up the life cycle of certain biennials from two years to one. This was a great advantage because it meant that the results of experimental crosses could be obtained in half the time.

The final sections of Mr. Canham's paper dealt with some miscellaneous applications of artificial light in horticulture, including its use for bulb forcing. Although a bulb could be brought to the flowering stage in complete darkness, the growth was then tall, weak and colourless and light was required for chlorophyll production. For this purpose quite a low illumination from tungsten lamps was adequate.

The discussion was opened by Mr. C. A. Cameron Brown, of the British Electricity Authority, who referred to the earlier history of the subject, mentioning in particular the work of Dr. W. J. C. Lawrence, of the John Innes Horticultural Institute, in promoting the use of the mercury vapour discharge lamp. He thought the new partially corrected H.P.M.V. lamp might be valuable on account of its greater red content. Measurements in terms of energy were, he said, difficult to comprehend, and he asked whether it would not be possible to use some kind of corrected lumen per square foot based on the response curve of the plant. He mentioned that tulips and daffodils were sometimes brought to bloom entirely by artificial light, being grown in enclosures from which daylight was entirely excluded in order to save loss of heat.

Mr. F. E. Rowland took up a point raised by Mr. Cameron Brown regarding the arrangement of control gear in such a way that the banks of lamps could be moved without any need to shift the heavy auxiliary gear. He said that it was often convenient to place this gear outside the greenhouse altogether, so as to remove it from the warm, humid atmosphere. He said that electricity boards should have a member of the staff who would be competent to advise growers on the proper use of light.

Mr. J. S. Smyth drew an analogy between the spectral response curve of a plant and that of a photographic emulsion, and he asked whether the reciprocity law (i.e., equivalence of time and intensity) applied to plant growth.

Mr. Howard Long asked whether any work had been done on the use of resistor ballasts, using the heat from these to help with the warming of the greenhouse.

Mr. F. Jackson said that the use of light was new to the grower, and it was necessary for him to acquire familiarity with this novel technique before he could expect to get the best results from it. He suggested that it might usefully be introduced by first putting in a small installation. One difficulty was that growers, when trying out the effect of lighting, were very apt to introduce some other variable at the same time, such as the application of a new fertiliser. Speaking from the lamp-maker's point of view he said that fluorescent lamps could be produced with their maximum emission in the region 3,000 to 4,000 Angstrom units if these would be of any value to the grower. He asked, too, if the germicidal lamps on the market could be applied to the extermination of viruses.

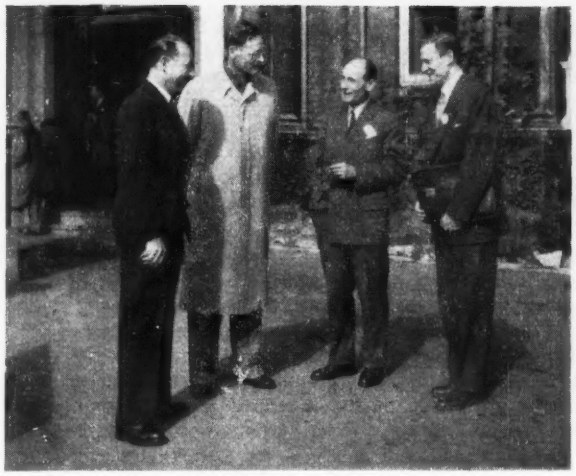
In his reply Mr. Canham said that the increase of dry weight produced by light, and the increased cropping which was the primary interest of the grower, were two different things, and the relation between them was a matter for the plant physiologist. As regards the use of a "corrected" lumen, he said that the relation between energy and photo-synthetic effect not only depended on wave-length, but it also varied somewhat from plant to plant. He said that for normal values of irradiation and time the reciprocity law was valid. With regard to the use of a small-scale installation as an introduction, he felt that this was open to objection, as small-scale experiments of this nature were always liable to give misleading results. Finally, he said that while the radiation from germicidal lamps would undoubtedly kill the viruses, it would equally certainly be lethal to the plants.

The display of new lighting equipment which took place at the Palace Hotel on the Wednesday evening and which proved to be a great success is described in detail elsewhere in this issue.

Visits to Lamp Factory and Schools

On the Thursday morning instead of holding a technical session arrangements were made for visits to the Siemens lamp factory at Preston and to two recently completed schools. It was not possible in the time available for those who went to Siemens to see all the manufacturing processes and the party was therefore divided so that some saw the manufacture of tungsten lamps and the remainder saw the manufacture of fluorescent lamps. All who took part agreed that it was a most useful and instructive visit.

The two schools visited were the Fulwood Modern Secondary School at Preston, which had been designed by the Architect's Department of the Lancashire County Council, and the Thomas Linacre Modern Technical School at Wigan. The architect of the latter school was Mr. Grenfell Baines, who had arranged both visits, and who was present at Wigan to conduct the party round the school. These visits were certainly instructive to those who had maybe only read about the post-war schools



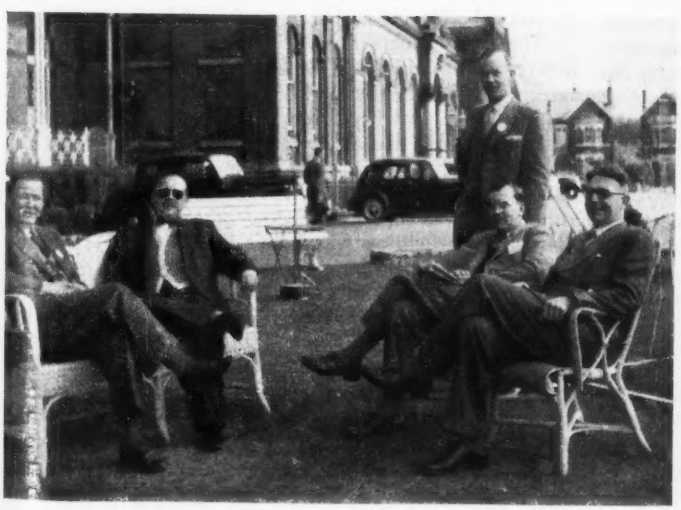
Top: *Mons. A. Rossi (France), Mr. J. M. Langebaerd (Holland), Mons. J. Maisonneuve (France) and Mr. E. Päivärinne (Finland).*

Top right: *Mr. Grenfell Baines conducting visitors round the school at Wigan.*

Right: *Mr. Guy Campbell (vice-pres.) with Mr. A. E. Canham (E.R.A.). Extreme right: Mr. E. S. Evans (Ekco - Ensign) with Mr. Arthur Young (Troughton and Young).*

Below: *Mr. D. A. Strachan (N.C.B.), Mr. N. C. Slater (Furze & Co.), Mr. P. D. Figgis and Mr. J. Pearse (B.T.H.) and Mr. J. T. Grundy (Siemens).*

Below right: *Mr. B. Knudsen (Denmark) with Miss J. Wood and Mr. Päivärinne.*



but had never been inside one; the several overseas visitors who were present were particularly impressed.

Lighting Economics

On the Thursday afternoon there was a very full programme. With Mr. W. J. P. Watson, Vice-President, in the chair no less than four papers on the economics of lighting were read, each describing some specific installation which the author had decided upon after detailed comparisons of costs.

The first author was Mr. S. T. Clark, of Henry Lister and Sons, Ltd., whose problem was the lighting of a large woollen mill. He first gave a brief outline of the various processes for which lighting was required and divided them into three groups. Typical of the first group was the process of mule spinning for which good general lighting was required. Only tungsten and fluorescent lighting were considered because the restricted height ruled out the use of mercury vapour lamps and various considerations, one of them the high initial cost, made a cold cathode installation unacceptable. Costs were estimated on the basis of 3,750 hours' burning per annum, with power at 1.1 pence per unit. Allowing for a reasonable amortisation period, the comparison showed a difference of costs of between 20 and 25 per cent. in favour of the fluorescent system. Further, although the comparison was on the basis of equal average illumination, it was considered that the fluorescent system gave a better light distribution over the work. The installation finally put in, said Mr. Clark, provided an illumination of 18 to 20 lm./ft.^{2} at 2 ft. in front of the rollers and a minimum of 10 lm./ft.^{2} in the centre between a pair of mules.

As a typical process in the second group, Mr. Clark took weaving and in this case, too, fluorescent lighting was chosen, both on account of its more favourable cost and also because of the better light distribution. The illumination on the cloth was 40 lm./ft.^{2} and that on the shuttle box 15 lm./ft.^{2}. The third group contained the very exacting inspection processes, including burling and perching, for which an illumination of at least 40 lm./ft.^{2} was needed and again fluorescent was found to be the most satisfactory form of lighting.

In the second paper Mr. W. Howe, of Donald Smith, Seymour and Rooley, described the lighting of a large engineering factory where high quality precision work was being carried out. The factory was on shift work so that the artificial lighting was in almost continuous use. This and other factors caused the cost of power to be exceptionally low, approximately one penny per unit. High pressure mercury and sodium lamps were ruled out on account of colour so that the choice was narrowed to tungsten, blended tungsten and mercury, hot cathode and cold cathode fluorescent lighting. Of these, the first two were considered undesirable because the height at which the fittings had to be mounted and the large expanse of the workshops meant that the light sources would be directly visible to the operatives and there was a probability of some glare. Further, the comparatively short life of the tungsten lamp meant more frequent replacement and so higher maintenance costs.

The choice lay, therefore, between hot cathode and cold cathode lighting and a careful comparison between the costs of these two systems was made. Mr. Howe plotted a graph showing the relative costs of obtaining a given illumination according to the price of power and he found that the crossing point of the curves came at about 1.3 pence per unit. His figures were arrived at by assuming a burning period of about 4,200 hours per annum and by taking typical fittings. He pointed out that when the comparison was being made, the instant start circuit for the hot cathode lamp had not been fully developed and, further, that the life of this lamp was taken as 4,200 hours and not the longer period now usually claimed.

The third author, Mr. F. Jones of Messrs. Babcock and Wilcox, Ltd., described a high bay mercury lighting installation in the crane shop of a large engineering works and first he set out the conditions which had to be fulfilled. These were, briefly, a good general illumination of 15 to 17 lm./ft.^{2}, using the minimum number of fittings and taking advantage of the overhead travelling cranes for erection and wiring. Three systems were compared, viz., 1,000-watt 440-volt mercury vapour, 400-watt 250-volt mercury vapour and 1,000-watt 250-volt tungsten. Taking the price of power as 1.1 pence per unit and the number of burning hours per annum as 2,700, the costs of providing the same illumination by each of the three systems were compared for a working period of 10 years and it was found that the three were in the ratios of approximately 0.8 : 1 : 1.3. The first system was therefore adopted.

Mr. Jones gave a number of details of the installation and of the method of wiring. Adjacent lamps were wired to different phases and a simple fitting with enamelled steel canopy and anodised aluminium reflector was used.

The fourth paper was by Mr. G. W. S. Levey of McLellan and Partners, who described the lighting of the Abbey Works of The Steel Company of Wales. Again conditions were such as to keep the cost of power low, but the choice of blended tungsten-mercury was governed mainly by considerations other than cost, e.g., colour, and the avoidance of complete black-out if the voltage should fall sufficiently to extinguish the mercury arc.

In the main, two types of fittings were used. For areas with a dirty atmosphere, likely to contain corrosive fumes, totally enclosed fittings were installed. Elsewhere a specially designed fitting, housing two 400-watt H.P.M.V. lamps and one 1,500-watt or 1,000-watt tungsten lamp, was used. The filament lamp was housed in a standard vitreous enamelled reflector and on either side of it was a mercury lamp mounted horizontally with arc control coils and a light gauge aluminium reflector.

The four papers were discussed together, the first speaker being Mr. J. S. McCulloch, who expressed his agreement with the first and the last authors, but said that he felt Mr. Howe had been deceived in his economics while Mr. Jones had allowed economics to outweigh all other considerations. Cold cathode lighting, he said, had no economic advantages over the hot cathode system, although it was superior in some other respects. He felt that blended lighting was better than simple H.P.M.V. He pointed out that all the speakers had been dealing with installations where shifts were worked, so that the load factor on the equipment was especially favourable. With day shift working alone, he said, tungsten lighting was the most economical.

Mr. A. Lippestad, of Norway, emphasised the very high figures of electrical consumption for lighting and said that he felt the economics of the subject were extremely important. The low efficiency of many lighting fittings was a serious matter and he estimated it might result in a

loss of no less than 6,000,000 units annually. He gave a series of figures of efficiencies and described fittings designed to give performances of 67 to 74 per cent.

Mr. A. N. Irens emphasised that the cost of really good lighting was only a very small fraction of the wages bill in a factory, generally between ½ and 1 per cent., and he felt that it should not be difficult to convince any factory manager that an expense of this kind would be amply justified by even a very small increase in production.

Mr. J. S. Hemmons pointed out that a good deal of water had flowed under the bridge since 1951, when Mr. Howe had made his calculations. Not only had the efficiency of the hot cathode lamp been increased but the uniformity of life had been greatly improved, and this should make group replacement a much more economical proposition.

Mr. L. C. Rettig said that good lighting relieved eye-strain and physical fatigue, while Mr. S. Anderson pointed out that its advantages were not so apparent when machines were running smoothly as when, for some reason or another, there was a stoppage. He asked whether Mr. Jones had found the colour of the plain H.P.M.V. lamp a disadvantage in the factory in which it had been installed.

Miss Jackson gave some examples of the way in which dirt accumulation had reduced the efficiency of a lighting system and said that cleanliness of the shop was very important to reduce the deposit of dust between one cleaning and the next.

The authors replied to various points of detail, particularly those connected with their calculations of cost. Mr. Clark said that, while cost was a very vital matter when deciding on the system to be adopted, other factors might have a good deal of weight if near parity of cost could be demonstrated.

Annual Dinner

On the Thursday evening the annual dinner and dance took place at the Palace Hotel, when some 350 members and guests were present and appeared to have a most enjoyable evening.

The speeches after the dinner were commendably brief and to the point. The toast of "The Society" was proposed by M. Jean Chappat, of Paris, who is a regular visitor at the Society's Summer Meetings and well known to members. M. Chappat said: "I feel it is a great honour to be asked to propose the toast of the Society. This invitation is no doubt because I am French, and will no doubt further strengthen the close connection which already exists between members of the I.E.S. and members of the Association Française des Eclairagistes.

"Every time I attend your Summer Meeting it is for me a renewed pleasure to meet again the numerous friends I am happy to have made amongst you, and especially to see the ladies, who are as young and charming as ever. Having now attended all your Summer Meetings, in Harrogate, Buxton, Eastbourne, and now in Southport, I would suggest that you hold your next Summer Meeting on a boat in the middle of the English Channel, outside the three-mile limit—and that you make it a joint meeting with the A.F.E.

"Though I and my colleagues are always very glad to come to your meetings, and also to welcome some of your members at our meetings in France, I am a little sorry that it is almost the same people who make these visits. These meetings provide an excellent opportunity for people from different countries to meet. I think that firms in the lighting industry have much to gain by sending people to these meetings in other countries.

"May I remind you that Henri Maisonneuve has already invited you to our meeting in Monte Carlo in June—what better place could there be for a lighting conference, where we can guarantee plenty of sun and anything else you may require.

"Once again, Mr. President, may I say how very happy I am to be with you, and I would ask you all to rise and drink the health of the Illuminating Engineering Society and the health of Mr. and Mrs. Stevens."

Needless to say M. Chappat's remarks were very well received as also was the reply of the President, who spoke as follows:—

Once upon a time a lady said to her long-suffering husband: "I hope you have no plans for the rest of the evening, I want to talk to you for a minute." On this basis I hope to keep you for about five seconds.

M. Chappat has spoken very pleasantly about the Society, and has invited us to attend their meeting in Monte Carlo. I can assure him that everyone in this room would be delighted to attend if it were not for certain material difficulties. But it would be good for us to go if we could, just as it is good to see so many visitors to our meeting from overseas, for it is by no means the least valuable service which our Society can do to bring together in friendship the people of different countries. I referred to this at Harrogate at the first Summer Meeting to which M. Chappat referred, and at which M. Maisonneuve spoke, and I am still convinced that it is true, that it is valuable to do all we can to discover and to understand the other man's foibles. After all, the faults of others, like headlights, are always more glaring than our own.

One of the most pleasant duties of the President in his year of office is travelling round the Centres We have a very vigorous Society, indeed, I often found it much too vigorous in the small hours of the morning, and frequently I was told by people in the Centres that we should publicise ourselves more. I seemed to be expected to suggest methods of publicity, and it occurs to me, therefore, that we might try some national advertisements on the lines of those already well known to us in the daily Press; for example, instead of "Glub washes whiter" why not "Light makes it brighter." Then we might try the type of advertisement published by the manufacturers of canned foods: "When my husband brought home his managing director unexpectedly I quickly served a meal under a pink table-lamp. By its light even the Spinster's peas looked delicious." Perhaps, too, you remember the delightful series of wool advertisements in which in verse some famous incident of history or myth is described. If we take the story of Leander, who was drowned while trying to swim to his fiancée, Hero, across the Helespont, we might derive the following:—

Leander swam the Helespont
To meet his Hero, who was wont
To stand upon the beach at night
And guide him to her with a light.
And then, alas, her bulb burned out,
The swimming swain went down the spout.
He might still be afloat, I guess,
If she had joined the I.E.S.

Finally, you will remember the Dubonnet advertisements which are in French and can be translated easily if you have good eyesight. " Ce soir "—perhaps in deference to M. Chappat I had better translate into English : " This evening, in the twilight, my uncle discovered that the new maid is really rather pretty. He turned off the light because he has learned from the Illuminating Engineering Society not to do close work in poor illumination."

But, of course, the best advertisement of all is the work we do, and I am sure that the Society will continue successfully to use light as a thing of beauty as well as utility, and so contrive to make life a little brighter.

May I finally, for my wife and myself, say thank you to you all—since this is the largest gathering of the Society which we shall meet this year—both for the very happy year of office which you have given us, and for the delightful way in which you have proposed and received this toast.

The toast of " The Guests " was proposed most lightheartedly by Mr. J. F. Stanley (Vice-President). In his reply Mr. D. H. Kendon, Chairman of the Merseyside and North Wales Electricity Board, referred to the great progress which had been made in electric light sources during recent years and drew attention to the dangers which continue to exist on the roads at night.

Decorative Commercial Lighting

The Friday morning session was devoted to a paper by an eminent lighting engineer from overseas, in accordance with the now well-established custom of the Society. M. André Claude, the immediate past president of the Association Française des Eclairagistes and a member of the family whose name has for so long been associated with neon and other gas discharge tubes, gave an inspiring and thoughtful address on " The Decorative Approach to Commercial Lighting."

Speaking in excellent English, M. Claude said that in order to achieve a really successful scheme of decorative lighting for commercial purposes, a theme, symbolic of what it was desired to display or advertise, should be agreed upon between the lighting engineer, the artist and the user. Then the artist should be given a free hand to develop this theme as his genius dictated.

On the subject of colours and whites, M. Claude had much to say and he said it forcefully. In his view a lighting scheme was decorative and aesthetically successful only if it commanded the spontaneous and immediate approval of all those who looked at it. It was on this basis that the aesthetically satisfying shades of colour had been selected by the public itself and it had become clear that all shades of white with a predominant emission in the blue and yellow parts of the spectrum were rejected as fundamentally inartistic. All the shades chosen and recognised as aesthetically satisfying were characterised by a predominance of emission in the red part of the spectrum, and this was very evident from the spectral distribution curves shown. These referred to the three shades popular in France, viz., Blanc Z, Rose de France and Cocktail. The last was richest in red light and was that generally found most satisfactory for social purposes.

M. Claude then described some very interesting fittings for combining tungsten with fluorescent lighting. The tungsten lamps used were krypton filled, because these gave a life of several thousand hours when operated at the normal efficiency of an argon-filled lamp and they could conveniently be used as ballasts for the fluorescent lamp, one 64-watt or two 40-watt lamps, rated at 140 volts, being used in series with one 40-watt fluorescent lamp on a 220-volt circuit.

The use of patches of colour was the next subject dealt with. In many successful decorative lighting schemes, said M. Claude, there were patches or points of coloured light which contrasted with the general colour of the scheme as a whole. Such contrasting patches of light might be obtained by using coloured fluorescent lamps directly visible to the eye or they could be objects such as tapestries or flowers lighted indirectly by such sources. This technique did not depend on the laws governing simultaneous contrasts, but it seemed that the function of these patches was to serve as tonal points of reference by which the colour value of the general lighting could be psychologically located.

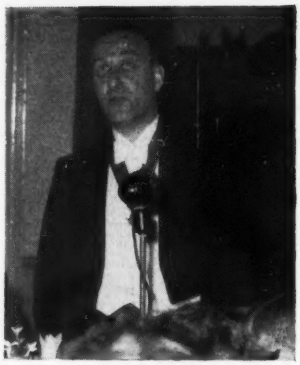
Finally M. Claude dealt with the use of luminous signs in advertising. He said that in France a battle had been waged for the last 40 years between the traditionalists and the moderns. The traditionalists said, " Let us ban signs because they are ugly." The moderns replied, " Signs can be decorative; they promote business, which means prosperity and life. We cannot always live in the past." The outcome of this battle was that at present in Paris there were certain " classified " zones, defined like small national parks, where signs were prohibited. Elsewhere there were luminous displays which were undeniably aesthetic in character. He went on to say that luminous signs in Paris showed clearly the supremacy of white or slightly coloured fluorescent hues, disapproval of vivid colours and the triumph of order over kaleidoscopic fantasies. He cited in particular the Place de l'Opéra where, he said, the arrangement of the luminous advertisements, their artistic design, the colours of the lamps used and the way they were distributed over the area gave the effect of outlining in luminous white chalk the boundaries of the place, the harmony of the buildings and the layout of the surrounding streets, while a patch of colour—that of a distant red neon tube at the Palais Royal—showed up the perspective of the Avenue de l'Opéra.

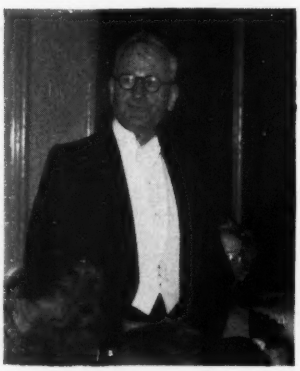
The lecture was illustrated with a large number of very fine slides in colour and these were so much appreciated by the audience that they were, by request, shown again before the discussion.

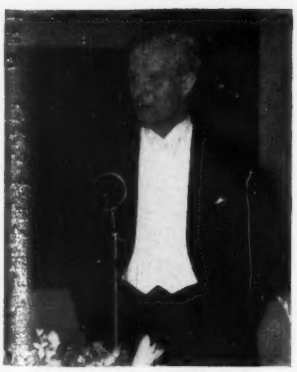
Mr. A. G. Penny, who opened the discussion, said that it was now clear that different artistic treatments of the same theme might be equally satisfying. He thought the Society might well consider whether, in its requirements for inclusion on the Register, sufficient attention was paid to the aesthetic side of lighting. He agreed with the author as to the decorative effect of combined tungsten and fluorescent lighting and this combination did much to overcome the effect of the excess violet in the fluorescent lamp. This was an important point and it should not be lost sight of in an over-preoccupation with the red content of a light. He asked whether M. Claude felt the time was yet ripe for the international standardisation of the colours of fluorescent lamps.

Dr. J. W. Strange asked how the consensus of opinion as to what constituted a satisfactory colour was arrived at. In his experience the public preferred the blatant to the artistic.

Dr. H. H. Ballin asked why only krypton-filled lamps







Left: *Speakers at the dinner.* (*i*) *Jean Chappat.* (*ii*) *The president.* (*iii*) *Mr. J. F. Stanley* (*vice-pres.*) *and* (*iv*) *Mr. D. H. Kendon.*

Above: *The president with the Mayor of Southport* (*Ald. W. Tattersall*), *Mrs. Stevens and Mrs. Tattersall.*

Below: *A party of members from the Newcastle Centre with Mr. E. C. Lennox* (*president-elect*).

were used as ballasts. He pointed out that in several of the installations of which slides had been shown, the tungsten and fluorescent sources had been widely separated whereas in the fittings they were combined. Which was the better arrangement in the author's view?

Mr. S. S. Beggs took up the point raised by Dr. Strange regarding the collection of opinions from the public and said that in experimental work on colour preferences it had been found impossible to get any definite results in this way.

In his reply M. Claude said that satisfactory results could only be obtained by collaboration between an artist and a lighting engineer: no individual could be expected to combine both rôles. The combination of tungsten and the "cocktail" fluorescent lamp was not recommended. The use of krypton-filled lamps in combined fittings was dictated by the consideration that the life of the tungsten lamp should be as long as possible. Some artists preferred a combined source, others liked to have the tungsten and the fluorescent separated; it was a matter of personal preference. The consensus of opinion as regards the preferred colour was arrived at by the accumulation of experience over a considerable period of time and after a number of trials.

M. Claude strongly advocated the standardisation of the colours of fluorescent lamps. In reply to a question regarding the control of luminous advertisement signs in France, he said that this was to a great extent a matter of agreement between the various parties concerned, one of these being a special committee of the Ministry of Fine Arts.

Home Lighting

On Friday afternoon, at the final technical session held under the chairmanship of Mr. J. F. Stanley, Vice-President, Mr. A. H. Young read a paper on "Home Lighting" by himself and Mr. C. J. Misselbrook. The authors first reviewed the developments which had taken place since 1928, the year which, in their opinion, marked the beginning of a new era in domestic lighting. The period 1930 to 1939 saw considerable advances, some attempt at standardisation and the improvement of design, and the authors showed a number of slides of typical fittings of about this time.

After the war the manufacture of domestic fittings to pre-war designs started again under very difficult circumstances. Materials were in short supply and trained designers were not available. The period 1947 to 1951, however, saw a new advance and a number of lighting fittings of an entirely different conception were introduced. It was the Festival of Britain, however, which convinced the lighting fittings industry that their designs were not suitable for the architecture and decoration of the times and the challenge was accepted, so that to-day, said the authors, the architect, interior designer and user had a wider range of well-designed domestic fittings from which to choose than ever before. It was, however, still difficult for the general public to see and buy well-designed and well-made lighting fittings.

The materials used to-day, said the authors, were very much more interesting and varied than 15 years ago. Aluminium, and plastics of various kinds, were widely used. A comparative new-comer was "chrysalline," while for shade-making a wide variety of materials, ranging from silk through furnishing fabrics to parchment, were pressed into service.

With regard to the planning of an installation, the authors said that, although some guidance had been given by Codes of Practice and the like, individual taste was the chief guide. The Code of Practice had done good work in encouraging the provision of socket outlets and it was regrettable that a later Government publication had advocated a reduction in the electrical installation in houses. Floor standards and table lamps provided great flexibility and could enhance considerably the atmosphere of comfort and relaxation in the living-room.

A long section of the paper was devoted to the subject of fluorescent lighting in the home and an examination of the reasons for its rarity. The authors gave a list of five objections frequently raised. These were (i) colour rendering and the colour appearance of the lamp, (ii) starting difficulties, (iii) choke noise, (iv) cost and (v) lack of suitable fittings. As a result of careful consideration of these various points, the following summary of the needs of the domestic fluorescent market was presented:— (i) A short lamp whose colour rendering and colour appearance would be nearer to those of the tungsten lamp: (ii) A real instant start circuit without chokes or transformers, with the minimum of component parts and adequately "suppressed" against radio interference: (iii) Attractive fittings of all types, i.e., ceiling, pendant, table and floor standards: (iv) Selling prices which should be greatly below those in force at the present time.

In the next section of their paper the authors gave some description of Continental and American practice in home lighting. In Western Germany, they said, great strides had been made in the last few years, while the Scandinavian countries had developed lighting fittings which could be moved about the room and hung on unobtrusive hooks on the walls or ceiling to ensure that the light was available where needed at any particular time. The influence of Italy in the design of fittings was very great.

On the question of electrical safety the authors said that this had become more important than ever owing to the widespread use of standards and they strongly advocated the use of apparatus with an earthing terminal and 3-core flexible conductor. They even went so far as to express the opinion that only apparatus so constructed should be sold to the public by retailers.

Finally, in a short section on the future of domestic lighting, the authors said that, while the new Deluxe Warm White fluorescent lamp was a further attempt to provide light of good colour for social purposes, it would not, without the other changes they had mentioned earlier, replace the tungsten lamp in the home. They mentioned the possibilities of electro-luminescence and then concluded their paper with the hope that more architects would interest themselves in lighting and in the work of the Society.

The discussion was opened by Mr. E. S. Evans, who said that the education of the general public in the principles and practice of good lighting was lamentably slow, and he cited as evidence of this the fact that even to-day thousands of conical opal shades were still sold annually. It was a gigantic task to get the lighting in the average home up to even a reasonable standard. He said that, while direct lighting by fluorescent lamps might be acceptable in the kitchen and the bathroom, in other rooms the lamps had to be concealed.

Mr. D. W. Durrant made the point that in the home a lighting fitting was judged by its daytime appearance

just as much as by the way it looked when in use. It was part of the furnishing of the room and had to take its place with other ornaments. The parsimony shown generally by the public when purchasing fittings was extraordinary.

Mr. E. B. Sawyer referred to the high rate of accidents in the home and said that most of these were due to people's inability to see something, such as the edge of a stair tread. In many homes, artificial lighting was used for most of the day in the kitchen as the daylight was quite inadequate.

Mr. A. G. Penny was emphatic about the danger from trailing flexes and gave the impression that he would like to prohibit all table or floor standards lest the flex be used by the children of the house as a skipping rope. A later speaker suggested that the best way to overcome this objection was to provide plenty of plug points.

Dr. H. H. Ballin expressed the opinion that fluorescent lighting was becoming more popular in the home: he supported the use of concealed lighting and in this he was followed by Mrs. Sawyer, who said that this was undoubtedly the best way to light a new home, though, as had been pointed out by Dr. Wellwood Ferguson, most existing houses were provided with a single ceiling outlet in each room for general lighting. To effect any considerable change in the arrangement of the lighting was a major operation and he felt that this was another reason for the reluctance of the ordinary householder to install fluorescent lighting.

Mrs. Holmes asked what was the best method of lighting a staircase effectively, while Mr. C. Hughes expressed the opinion that it was the illuminating engineer's job to educate the designer so that fittings which were attractive to look at might also be efficient as sources of light.

Mr. Misselbrook, replying to the discussion, made the point that the best way of educating the public to the appreciation of good home lighting was to show them really good examples. He disagreed with the suggestion that if fluorescent lighting was introduced into the kitchen its use might soon spread to the other parts of the house. In his opinion, the contrast in going from a kitchen lighted by fluorescent to other rooms lighted by tungsten, and vice versa, was unpleasant and might well lead to the removal of the fluorescent from the kitchen.

Annual General Meeting

The paper on home lighting was followed by the last formal session of the summer meeting, when the annual general meeting of the Society was held and the summer meeting was brought to a close.

In presenting the annual report and accounts for the year ending December 31, 1953, the President drew attention to the fact that for the first time the membership had decreased. He said that the Council was examining the reasons for this and reviewing the activities of the Society as a whole. Reference was made to the successful one-day meeting organised by the Midland Centres in June, 1953. The President expressed the appreciation of the Society to the honorary secretaries of local Centres and Groups on whose hard work and enthusiasm the activities of the Society outside London so much depend. He also drew attention to the formation of a Group of the Society in the Transvaal—the first such group to be formed outside this country. He said that reports received showed that the new group was most active and promised to grow.

Referring to the list of I.E.S. representatives on committees of other organisations the President said that the work put in by these representatives on behalf of the Society and the lighting industry as a whole was not as widely appreciated as it should be. He also expressed the thanks of the Society to the Illuminating Engineering Publishing Company for the improvements which had been made to *Light and Lighting*.

The adoption of the report was proposed by Mr. C. C. Smith (Liverpool), who said that in his opinion the two highlights of 1953 were the visit of Dr. Ward Harrison and the Trotter-Paterson Memorial Lecture given by Dr. E. D. Adrian. He expressed disappointment that the attendance of Council members at Council meetings was not all that it should be; he felt that if members take on this duty they should make every possible effort to attend meetings. With regard to the general activities of the Society he thought that attendance at this Summer Meeting alone was an indication of the regard with which the Society is held, and he included in his proposal a vote of thanks to the President, officers and members of Council for their work on behalf of the Society.

Mr. H. Carpenter (Blackpool) seconded the adoption of the report. He said that the Centres also were concerned with the drop in membership, and suggested that steps might be taken to secure more sustaining members, particularly from local government authorities.

The report was declared adopted unanimously.

The President then referred to the election of officers and members of Council to fill vacancies occurring in October, and declared that as there had been no independent nominations the following were elected:—

President:—Mr. E. C. Lennox.

Vice-Presidents:—Mr. H. G. Campbell, Mr. C. S. Caunt, Dr. W. E. Harper, Mr. A. G. Penny, Dr. J. W. Strange.

Members of Council:—Mr. D. S. Allom, Mr. A. W. Gostt, Mr. A. G. Higgins, Mr. G. E. V. Lambert, Mr. A. H. Olson, Mr. C. C. Smith, Mr. J. S. Smyth, Mr. H. E. G. Watts.

Hon. Treasurer:—Mr. E. B. Sawyer.

Hon. Secretary:—Mr. H. C. Weston.

Hon. Editor of Transactions:—Mr. C. R. Bicknell.

The President expressed thanks on behalf of the Society to retiring officers and members of Council, and particularly to Dr. Harper, for undertaking the editing of the Society's Transactions for the past three years.

Conclusion

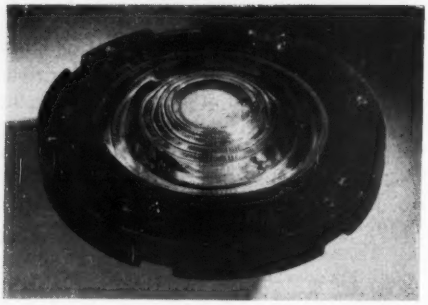
After the formal business of the A.G.M. the President said that it remained only to bring the Summer Meeting to a close. He expressed thanks to all those who had contributed to the success of the meeting, including the authors and those who had taken part in the discussions, Mr. F. J. Burns and Mr. G. W. A. Illingworth, who had been responsible for many of the local arrangements, and to Mr. Illingworth and his staff, who had made all the arrangements for the presentation of the papers in the Cambridge Hall. He thanked the firms who had supplied items for inclusion in the display of new lighting equipment, those members who had helped in the pre-

(Continued on page 244)

Lighting Equipment at Southport

Details of lighting equipment shown at the I.E.S. Summer Meeting. Some of the items have previously been described in this journal, but are new in the sense that they have been developed during the last two or three years, the period covered by the display.

G.E.C. fittings at Twickenham Railway Station.



Holophane aerodrome taxi-track light.

G.E.C. runway light.

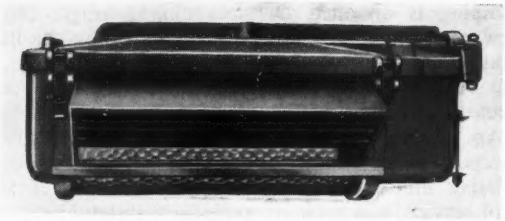
Group 1.—Land, Sea, and Air Travel

THE BRITISH THOMSON-HOUSTON CO., LTD., showed a prototype of the "Saphire" lantern with aero screening designed to conform with the Ministry of Transport specification for street lamps used in the vicinity of airfields. Distribution in this lantern is mainly controlled by a reflector system enclosed within the streamlined lantern, avoiding the use of wide hoods which tend to spoil daylight appearance. The lantern includes a spirit level as it must be levelled after erection. In addition, screening is provided by additional depths of cast bowl retaining ring. The lantern uses 250/400-watt mercury vapour lamps.

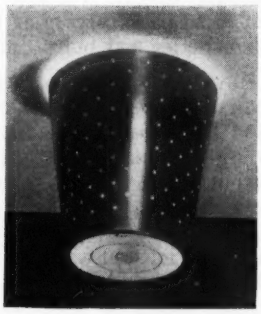
Another demonstration showed the use of a new 4-watt low pressure fluorescent u.v. lamp for instrument lighting in an aircraft cockpit. The lamp, which is made in a black long wave u.v. transmitting glass, is electrically similar to the normal fluorescent lamp, but the particular fluorescent powder converts the short wavelength u.v. energy in the arc to long wavelength u.v. The lamp operates from the 400-cycle 115-volt aircraft supply on a semi-resonant circuit, and an electrical dimming control is provided to enable the pilot to adjust the instrument brightness to his requirements.

THE BRITISH TRANSPORT COMMISSION demonstrated a hot cathode fluorescent fitting for use in railway stations and showing the station names. Each fitting accommodates three 5-ft. 80-watt fluorescent lamps and consists of an aluminium frame with cast aluminium alloy end pieces and an enclosure of low light-absorption "Perspex." On each "Perspex" side panel the station name appears in 3½-in. lettering in Southern Region green. The letters are applied by a process, patented by Compra Plastics, Ltd., in which they are protected by a "Perspex" film from the effects of weather. Remote switching enables one, two or three lamps in a lantern to be illuminated.

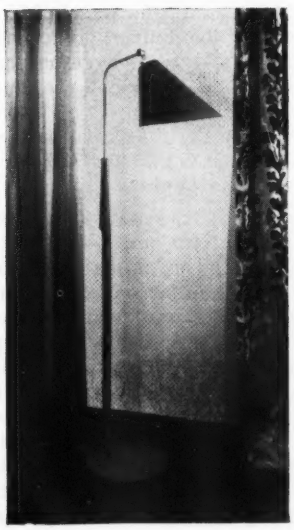
THE GENERAL ELECTRIC CO., LTD., displayed an elevated runway light of the three-element combined high and low intensity type designed for installation on instrument-controlled runways where full facilities are provided for landing in either direction in all visibility conditions. The lamps used are 6-volt 36-watt Bosch



Revo prototype street lantern with aero screens.



Courtney, Pope contemporary fittings.



Troughton and Young floor standard.

Cap type for the low intensity element and two 12-volt 100-watt Bosch lamps provide for the high intensity requirements. The runway light is made of cast silicon aluminium alloy and has detachable ends with a special spreader glass. The light is mounted on a ball and socket joint to allow of correct alignment with the runway axis, and the stem base is attached by a special renewable breaking plate which allows the light to break off in the event of a collision with an aircraft.

Also shown was an underwater floodlight with specially designed 1,000-watt lamp which was developed in collaboration with the Admiralty Research Laboratory. Units of this type were used in the search for the Comet aircraft lost off the Isle of Elba. The lamp has an objective efficiency of 24.5 lumens per watt at a life of 50 hours. The bulb wall thickness is only about 1 mm. because the elasticity of a thin wall is desirable to avoid cracking as a result of steep temperature gradients. Such bulbs will withstand pressures up to 650 lb. per square inch, representing a depth of approximately 1,500 ft. The reflecto. is of anodised aluminium, and the total weight of lamp, reflector and accessories is only some 3 lb. (See *Light and Lighting*, April, 1954, p. 120.)

HOLOPHANE LTD. exhibited an aerodrome taxi-track light to withstand the wheel impact of heavy aircraft running along the centre-line of taxi-tracks at perhaps 30 m.p.h. Aircraft tyres are high pressure and the fitting will withstand a ton per square inch on the glass dome and yet remain watertight and efficient. The colour of the light depends on the inner prismatic glass refractor designed to give 100 candlepower around 360 degrees at angles close to the horizontal and yet only 5 or 10 candlepower at high angles. The 36-watt lamp can be changed without disturbing either the cover glass or the electrical connections.

REVO ELECTRIC CO., LTD., featured a prototype model of a street lighting lantern for 140-watt sodium lamp, made of cast aluminium alloy and incorporating specially formed prismatic panels to provide medium angle non-cut-off distribution, but with the addition of aero screens to limit the upward emission in conformity with the recently issued Ministry of Transport specification, while at the same time permitting a staggered spacing of 135 ft. at 25 ft. mounting height, without the formation of alternate light and dark bands on the road surface. A special feature of the design is that the aero screens can be partially removed to facilitate cleaning of the lantern.

Group 2.—Contemporary Domestic

ALLOM BROS. LTD. showed their T.24 table standard. (See *Light and Lighting*, October, 1953, p. 397.)

COURTNEY, POPE (ELECTRICAL) LTD. displayed three fittings. The D.98 pendant fitting which will accommodate lamp sizes up to 150 watt and can be supplied with several types of suspension, i.e., rise and fall flexible, rod with ball and socket or solid rod as required. The fitting is manufactured from anodised aluminium expanded metal and tapered strips of black aluminium to a semi-diabolo shape, the final shape being both effective and modern for domestic and display uses. Where necessary, a polished aluminium reflector can be fitted to increase the downward component of light.

The D.50 ceiling mounted fitting comprises a ceiling

plate with B.C. holder and supports for the outer spinning, which is suspended one inch below the ceiling line, allowing for an halation effect. This spinning is pierced overall with ⅛ in. diameter holes and is stove enamelled white inside and anodised to a brass finish outside, the shape being that of an inverted truncated cone. The opening in the underside is fitted with a concentric ring louvre which permits controlled downward lighting.

The T8/R fitting comprises a simple ventilated bullet shaped spinning 6¾ in. deep with a soffit ring to give fixings. The fitting is fitted with a B.C. holder and is intended for use with the 75-watt internally silvered lamp, the face of the lamp being approximately flush with the finished soffit.

SIEMENS ELECTRIC LAMPS AND SUPPLIES LTD.—A transportable desk or table fluorescent lamp was shown with control gear housed in the all-metal base. "U" shaped tubular arms support the 18-in. fluorescent lamp and plastic shade, in addition to carrying the lamp wiring cables. A push-button switch on the base controls the light and forms the terminating point of the lamp-support bracket, the finish is a special heat-resisting enamel which is available in a wide range of colours.

TROUGHTON AND YOUNG (LIGHTING) LTD. exhibited the "Mondolite" table lamp which was also shown as a wall bracket. It consists of a tubular metal base to which is pivoted the lampholder mounting which is retained in a vertical position by means of a counter-weight. A small thumbscrew enables the mounting to be locked in any desired position. The shade is in convex pleated white plastic and the fitting is suitable for lamps up to 75 watts. The metalwork is finished in satin brass with the counter-weight in black, and is complete with a length of three-core cable. (See *Light and Lighting*, May, 1954, p. 150.)

Also displayed was the "Mondolite" adjustable floor standard in natural mahogany and satin brass metalwork with variation in height from 3 ft. 11 in. to 5 ft. 6 in. The base is circular 1 ft. in diameter carrying the mahogany stand into which the tubular metal support is fitted. The shade is attached to the standard by means of a knuckle joint and is of card finished white inside and cherry red, lemon peel or cloud grey on the exterior surface. It is edge perforated and is suitable for use with lamps up to the 100-watt size.

Group 3.—Flameproof

THE GENERAL ELECTRIC CO., LTD., submitted three items to this section. A flameproof fitting (Group I) for 60-watt tungsten filament lamp for use at the coal-face. The diffusing "Perspex" front is clamped over a felt gasket and is removable for cleaning. Behind the "Perspex" is armour-plate glass cemented into the front frame. Access to the lamp is by removing the four screws which secure the body to the top casting. The fitting is provided with tapped bosses at the back, to which may be secured pit prop clamps or brackets for conveyor mounting. Reversible male and female couplings are provided so that the supply may be from either side.

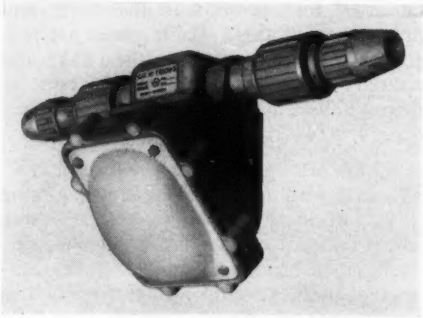
A flameproof fitting (Groups I and II) for 5-ft. 80-watt fluorescent lamp. This fitting embodies a special lampholder and other features, the combined effect of which is to limit the maximum pressure rise on internal ignition to about half the permitted pressure. Access for relamping is obtained by slackening a single captive screw, and relamping can be carried out using one hand. Fittings may be mounted in line end to end since the lamp comes away downwards and enamelled steel reflectors are available.

An emergency light approved by the Ministry of Transport and certified by the Home Office for use in explosive atmospheres. Primarily developed for ship-board service, it is robustly made to withstand extremely rough usage. It is normally stowed in the inverted position by a hook or clip, on the bulkhead in the engine-room, wheelhouse, corridors, etc. When reversed by swivelling in the clip so that the armour glass dome is uppermost, it automatically lights by means of a gravity-controlled switch. The light has a burning life of from eight to 20 hours, according to the type of cell used, and both batteries and bulbs can be easily replaced.

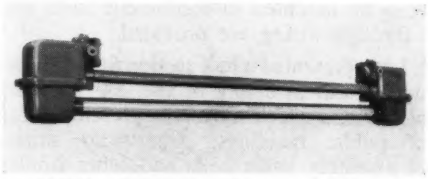
HEYES AND CO., LTD., provided a 60-watt flameproof hand-lamp certified for flameproofness under Groups II and III. The main enclosure, to which the bezel ring holding the glass and guard is secured, is of cast aluminium and contains a porcelain B.C. or E.S. lamp-holder which is connected by heat-resisting cable to the insulated bushes passing into the joint box. The joint box is cast integral with the main enclosure and is fitted with a packing gland for cable entry. Means are provided within the joint box for clamping the cable and for earthing the screens and earth core. The lid of the joint box also forms the handle. It is a condition of the certificate that the cable used with this unit shall be tough rubber-sheathed three-core cable with individually screened cores not less than 23/.0076.

HOLOPHANE LTD. had a flameproof lantern developed for the lighting of hazardous areas, roads and petroleum storage tank farms for which relatively large light sources are required in order to enable the number of fittings to be kept to a minimum. It comprises a die-cast silicon aluminium alloy casting supporting a clear toughened well glass with a single-piece dome refractor fitted inside, which provides an efficient optical light control. The dome refractor is a standard street lighting glass, and there are two types giving symmetrical and two-way non-axial (170 degrees) light distributions respectively. A separate wiring chamber is formed in the main casting, and a removable metal plate gives access to the terminals inside the fittings. The enclosure is, therefore, water-tight, and the main casting has a watershed lip to prevent moisture draining down and seeping through the gap between the cast hood and the detachable flange supporting the toughened well glass. Certified for use with 300-watt G.L.S. and 250-watt MBT/U blended mercury/tungsten lamps.

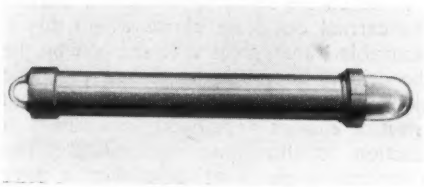
Also featured was a flameproof asymmetric pendant certified for use with Groups II and III inflammable gases. This fitting was developed for the lighting of vertical surfaces of control panels in oil extraction plant control rooms and similar applications. The chief feature is a slightly dished prismatic cover glass which gives the asymmetric distribution necessary to direct the light emission forward on to the panels. The fittings can, therefore, be suspended or recessed in the ceiling in front of the panels without the need for tilting the units to project the light on to the vertical surfaces to be illuminated. The fitting comprises a silicon aluminium alloy casting with a separate wiring chamber, access to



G.E.C. tungsten mine lighting unit.



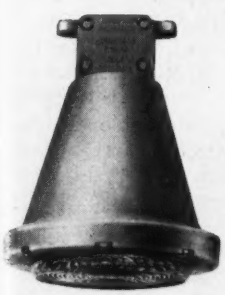
G.E.C. fluorescent flameproof fitting.



G.E.C. emergency light.

Heyes flameproof handlamp.

Holophane flameproof lantern.



Holophane flameproof asymmetric pendant.

which is provided by means of an external removable cover plate at the top. A prismatic reflector, fitted inside the cast hood, effectively controls the light emission from the lamp in the upper hemisphere, directing it down on to the asymmetric prismatic cover glass which redirects forward on to the vertical surfaces of the panels. Certified for use with 200-watt G.L.S. and 125-watt MB/V mercury discharge lamps.

REVO ELECTRIC CO., LTD., demonstrated a new design of luminaire for mines roadways for 60/100-watt tungsten lamp. This is of the nature of a miniature cut-off street lighting fitting, the light control being obtained by means of adjustable silvered mirror reflectors of special formation to provide uniform light distribution at spacing-height ratios up to 5:1. This is a flameproof unit designed in conformity with B.S.889/1947.

Group 4.—Research Aids

THE BRITISH THOMSON-HOUSTON CO., LTD. demonstrated a model produced to enable a study to be made of the lighting for an interior, taking into consideration the main variables, such as room index, surface reflection factors and source distribution. Frequently it is desired to design for positions other than those on the working plane, and a precise value at a given point rather than the average over an area is required. Furthermore, it is an advantage to be able to design an installation from a specification of the final luminance required on any room surface, and to do this it is necessary to separate the total illumination at any point into its two components, the direct and inter-reflected light.

Also shown was the type FA.5 xenon flash tube which has been successfully used for the taking of colour photographs of the living human retina. The tube may be operated to provide a continuous source of light for focusing the optical system and during the taking of a photograph the light intensity is momentarily increased to a very high level for a brief period of 1/25 second. This application has been carried out in collaboration with the Institute of Ophthalmology and some excellent colour photographs taken were displayed.

Also on view was the type FA.12 xenon flash tube which has been designed to fulfil the increasing demand for simple portable flash units using dry batteries. The flash tube operates over a voltage range of 145-200 and is unique in its construction since it retains the plug in principle. When dissipating a maximum energy of 50 watt seconds the effective flash duration is about 1/800 second. The power pack is simple, the capacitor which stores the energy for the flash is charged directly from the dry battery. A conventional trigger circuit is arranged so that the voltage across the camera contacts does not exceed 150.

THE GENERAL ELECTRIC CO., LTD. exhibited a mains operated photometer designed for use in all precision measurements, particularly where very small amounts of light are concerned. It has a limiting sensitivity of between the values of 10^{-6} to 10^{-9} lumen of white light, depending upon the values of the grid leak in the photometer unit. The photometer unit comprises an electrometer valve, photocell and grid leak in one evacuated bulb, and is operated in conjunction with a D.C. valve bridge amplifier. Balancing of the amplifier bridge is indicated by a null reading of the galvanometer. A mains operated power

pack and precision voltage regulator for operating the control cabinet is also provided.

An electroluminescence panel was also featured in which a fluorescing material is incorporated in the dielectric of a capacitor, one plate of which is transparent allowing the light produced to emerge. The supply to the plate has a frequency of 4,000 cycles and the voltage may be varied from 0-100. Generally speaking, achievable brightness increases with voltage and frequency, but panels must be designed in such a way that they will not be damaged by the supply with which they are to be used. In some applications, where only a low brightness is required, panels can be constructed to operate direct from standard 230-volt 50-cycle A.C. mains.

Group 5.—Industrial

BENJAMIN ELECTRIC LTD. showed a blended light unit for use with incandescent and mercury discharge lamps. The top trough houses the complete control gear, so that only two leads need be connected to the unit; it also contains the "Saaflux" lampholders thus conserving height. The reflectors are readily detachable for servicing purposes and full access to the control gear is obtained by means of the hinged lid at the top. There are also three reflector models to take such combinations as one 1,500-watt tungsten lamp with two 400-watt mercury discharge lamps. (See *Light and Lighting*, January, 1954, p. 27.)

Also shown was the "Saaflux" deep bowl reflector designed to have a cut-off at 60 deg. from the vertical, thus affording improved protection against glare when compared with a normal cut-off at 70 deg.; it has a dispersive light distribution. Constructed of suitable gauge steel with the highly efficient vitreous enamelled finish, the fitting incorporates the usual thermal control and readily detachable characteristics of the "Saaflux" system. Suitable reflectors are available for 300-watt to 1,500-watt lamps and except for the 1,000- and 1,500-watt sizes can be totally enclosed.

THE BRITISH TRANSPORT COMMISSION provided a dust-tight dispersive fitting for locomotive shed lighting. This is a special fitting designed for use where a robust and totally enclosed unit is required. It is ideal for those situations where dust, dirt and vapour are present. The unit is designed with a 15 deg. cut-off when used with 150- or 200-watt G.L.S. lamp. Body of die-cast aluminium with phosphor bronze bush inserted for conduit entry, pyluminized and painted grey outside and white inside, complete with a clear glass dish cemented into the hinged iron ring with an oil-resisting soft rubber gasket between the front rim and the body, stainless steel wing screws and a porcelain-skirted Edison screw lamp holder, top entry tapped electric thread 1 in. diameter.

EDISON SWAN ELECTRIC CO., LTD. showed the "Blendolite," a twin reflector colour-blended lighting fitting, constructed in heavy gauge steel comprising an equipment platform and a channel shaped cover. The platform carries the reflectors, the choke and interconnecting wiring with connector block. The cover is mounted either direct to the ceiling or suspended and the detachable platform is linked by safety chains to permit suspension while the supply connection is made. The platform is then lifted into position in the cover and locked by a simple sliding motion. Baffle plates are provided within the ventilated canopies and the choke and capacitor (if required) are mounted on the underside of the platform to ensure efficient operation. (See *Light and Lighting*, April, 1954, p. 117.)

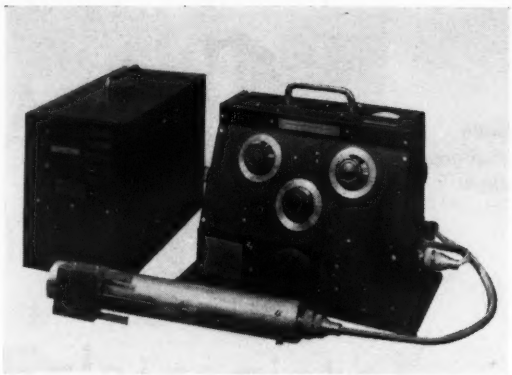
EKCO-ENSIGN ELECTRIC LTD. submitted a P.V.C. plastic reflector for use with single, twin and triple lamp 5-ft. 80-watt fittings, and single and twin lamp 4-ft. 40-watt fittings. The salient features of the plastic reflector are: almost unbreakable; cold formed and therefore satisfactory for all normal ambient temperatures; resistant to many corrosive atmospheres; easily cleaned; very light in weight, easy to handle and immediately detachable; and no deterioration through storage. The spine contains 200/250-volt 50C. twin lamp (lead-lag) tapped control gear. Fittings can be mounted in continuous rows and knock-outs for through wiring are provided.

HOLOPHANE, LTD. presented a half section fitting showing the construction and assembly of the 200/300-watt Lentilite controlens units which have been developed for the lighting of public buildings, department stores, canteens, school assembly halls, halls and other similar installations. The fitting comprises a sheet-metal box designed for ceiling recessment and in which is housed a superpurity anodised aluminium reflector assembly. A detachable top to which the reflector is secured enables re-lamping to be carried out from above where this is possible. A removable frame, secured to the box on the underside of the ceiling, supports the dished prismatic lens plate which projects approximately $2\frac{1}{2}$ in. and sufficient to permit of enough light being transmitted in an upward direction to illuminate the ceiling. The circular dished controlens plates are available in three sizes for use with lamps up to and including 500 watt. Various reflector assemblies, developed for use with the lens plates enable intensive and concentrating light distribution to be provided. Fittings are available for various depths of ceilings and alternative metalwork for close ceiling mounting where recessment is not possible.

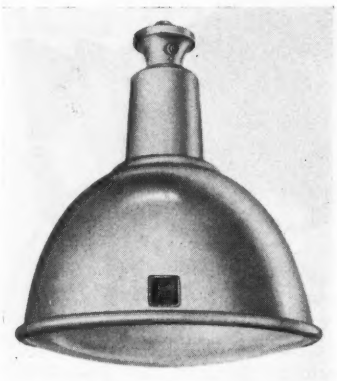
A new fitting could also be seen developed for the lighting of halls and similar applications for which a medium size pendant is required with a high light output efficiency combined with a pleasing appearance. It is designed for use with 500-watt lamps and gives an intensive type light distribution. The glassware comprises a prismatic reflector which provides an efficient light control fitted with a diffusing bowl on the inner surface of which there is a novel pattern of diffusing prisms giving a pleasing and interesting appearance to the fitting. The inner surface of the bowl has a light velvet finish and this, in conjunction with the arrangement of the diffusing prisms, results in a low luminance with a soft diffuse light emission. The glassware is supported internally from the canopy and fittings will be available for either down tube or chain suspension.

LINOLITE, LTD. showed an adjustable fluorescent reflector for local lighting of benches, drawing-boards, etc., which can be used with 18-in. 15 watt, 2-ft. 20 watt or 4-ft. 40 watt fluorescent lamps.

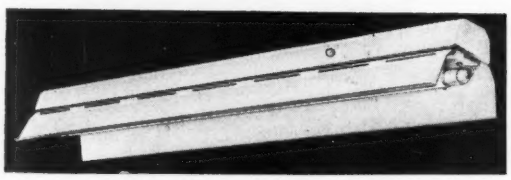
REVO ELECTRIC CO., LTD. introduced a new design of dust-proof fitting for 150/200-watt tungsten lamp to meet the latest requirements for situations where inflammable or explosive dusts are present.



G.E.C. universal photoelectric photometer.



Benjamin deep bowl reflector.



Ekco-Ensign P.V.C. reflector.

Linolite adjustable fluorescent reflector.

Group 6.—Display and Floodlighting.

BENJAMIN ELECTRIC LTD. featured two floodlights. A trough floodlight made of cast aluminium alloy with an anodised aluminium reflector. This floodlight produces an asymmetric beam, broad along the major axis and comparatively narrow on the minor axis of the fitting, and is intended for illuminating surfaces with relatively small mounting projections. This fan-like distribution is more marked with the 60-watt tubular sodium lamp, but the unit will also accommodate two 100-watt or two 150-watt tungsten lamps, or even two 80-watt mercury discharge lamps. The robust weather-tight construction allows the fitting to be readily used out-of-doors whether directed upwards or downwards. Angular adjustment is afforded by a lockable rotary motion in the steel strap stirrup, and if desired the latter may itself be mounted at various angles on a projecting arm by means of "U" bolt fixings. (See *Light and Lighting*, April, 1954, p. 117.)

The other was an enclosed area floodlight intended mainly for the illumination of outdoor areas. When used for lighting vertical surfaces it can be supplied without the hood if desired. The aluminium alloy bracket is provided with "U" bolts for pole mounting, or alternatively can be used with rag bolts for fixing to vertical surfaces. The bracket is so designed that by reversing it, the reflector can be fixed to the edge of a horizontal surface. The fitting is available for 500-watt to 1,500-watt incandescent lamps, 250-watt to 400-watt mercury discharge lamps, or even 60-watt sodium.

STRAND ELECTRIC AND ENGINEERING CO., LTD. provided a small compact 250-watt mirror spot which gives a clear-cut beam of any required shape and of an intensity that is quite exceptional owing to the optical system employed. The lantern was designed to incorporate a medium prefocus lampholder for the 250-watt Class B1 round bulb lamp, but a 500-watt Class A1 lamp may also be used, or preferably 500-watt Class T lamp which has a Class A type filament in a round bulb. The standard lantern gives beam angles up to 22 deg.; the beam angle may be increased to 37 deg. by fitting an extra 5-in.-focus plano-convex lens, or decreased to 11 deg. by fitting a 6-in. lens in an alternative to the standard lantern. (See *Light and Lighting*, January, 1954, p. 14.)

A 1,000-watt long-range spotlight was also displayed which incorporates super-pure aluminium elipsoidal reflectors which collect a large solid angle of light, which is projected as a narrow-angle clear-cut beam of a high intensity. Iris diaphragm and masking shutters vary size and shape of the spot. The lantern is, therefore, an efficient substitute for a small arc and is specially suitable for long throws, either as a fixed spot or for following artists on the stage. A 1,000-watt Class A1 projector lamp is used with pre-focus cap and as the lamp is pre-tilted within the lantern the angle of tilt may be 45 deg. below horizontal to 5 deg. above. Maximum beam angle 15 deg.; minimum 6 deg.

Group 7.—Miscellaneous.

BENJAMIN ELECTRIC LTD. displayed a horticultural fitting developed to meet the demand for a robust unit of suitable characteristics. The vitreous enamelled finish is

particularly suitable for the humid conditions encountered. To obtain the high irradiation densities necessary mercury discharge lamps are employed, and this unit accommodates the standard 400-watt lamp burnt vertically, thus minimising temperature effects. The asymmetric distribution of the radiation of the fitting enables a central row of units to be suitably arranged so as to cover the standard 3 ft. 6 in. or 6 ft. wide benches normally employed.

EKCO-ENSIGN ELECTRIC LTD. had a range of starter switches redesigned to incorporate the following improvements: Coloured canisters to indicate the type of switch; smooth finished solderless pins; and robust canisters and bases.

THE GENERAL ELECTRIC CO. LTD. displayed a plant irradiator unit using h.p.m.v. lamps which offers little obstruction to daylight and provides the high intensities of illumination required for stimulating plant growth. The irradiators are frequently suspended from rails so that they can be moved between two batches of seedlings, thus doubling their effectiveness. Up to the present their use in this country has been principally for tomatoes and cucumbers, but as more experience is gained the variety of plants treated will increase.

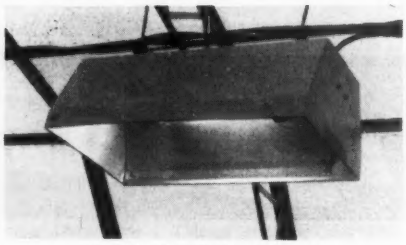
THE GENERAL POST OFFICE provided a spring lampholder assembly which is fitted to P.O. fluorescent fittings using 5 ft. B.C. lamps. It has the advantage that a lamp can be changed from one end, using only one hand. The far end of the lamp is guided into its holder and then gently pushed against the far end lampholder spring to enable the near end of the lamp to be slid into its lampholder. The flicker screen is then slid into position over the end of the lamp. To allow for the lamp cap pins being out of alignment, the moulded lampholder can turn in the bracket fixed to the slide. The slide has a travel of $\frac{3}{4}$ in. on two tongues forming part of the cover plate, and the cover plate carrying the lamp assembly is screwed to the fluorescent fitting.

A plug-in emergency lighting fitting for manual switchboards intended to give emergency lighting on telephone switchboards during periods of mains failure was demonstrated. A special socket at the top of each operator's panel is connected to the 50-volt telephone exchange battery. When the plug is placed into the socket the 6-watt S.B.C. lamp will give sufficient illumination to enable the operator to continue to work. The lamp is protected by a green rubber sheath to absorb inadvertent knocks by the operator's hand while making connections. Damage to the lamp and plug is therefore avoided. A hole in the sheath, above the lamp, gives ventilation, and the chromium-plated sleeve holds the sheath tightly to the connecting plug.

SIEMENS ELECTRIC LAMPS AND SUPPLIES LTD. provided the "Sieray" 200-watt dual lamp consisting of a mercury vapour discharge lamp connected in series with a tungsten filament which not only serves to control the arc current of the discharge section, but also acts as a secondary light source. As the major portion of the energy from the tungsten filament is emitted at the red end of the spectrum, a considerable improvement in colour rendering is obtained. The lamp is of a special parabolic shape and is half internally silvered, thus eliminating the need for an external reflector.

Benjamin enclosed area floodlight.

Strand Electric 1,000-watt long range spotlight.



G.E.C. horticultural unit.

Benjamin horticultural unit.

Association Française des Eclairagistes at Monaco

Prof. and Madame Le Grand.

During recent years the Association Française des Eclairagistes have held their annual meeting in many attractive places, but none perhaps so attractive as Monaco, where the 1954 meeting was held from June 7 to 12. The Principality offers so many attractions that it is surprising that each day so many of the 300 delegates attended the meetings; it only indicates, however, that the various papers and communications were of sufficient interest to draw people indoors out of the (at least to the British delegates) unaccustomed and welcome sunshine.

It is the practice of the French society to arrange their meetings in very close collaboration with the local authorities (we hope Monaco will forgive such a commonplace description). The meeting is, in fact, not described as a meeting but is given the much more descriptive title of "Journées de l'Eclairage"—descriptive because the whole place goes gay with floodlighting. In fact it might be said that the visit of the A.F.E. is an excuse to put lighting over in a big way. This has been done most successfully in the past, but probably no place has offered such opportunities as Monaco where the very geography of the place, with the mountains rising almost from the sea shore and the town of Monaco situated on its rock jutting out to sea, offers such splendid facilities to the lighting engineer to show floodlighting at its best. The night-time view of Monaco town reflected in the still waters of the Mediterranean is a sight which few who were there are likely to forget.

In addition to floodlighting the A.F.E. also arrange for many temporary street-lighting installations of all types. Along the quays and promenades good use was made this time of vertical fluorescent lanterns. Also very effective was the use of concealed tungsten and mercury lamps in the palm trees—a tree which co-operates very well with the lighting engineer.

The programme was an exhausting one. The daily sessions, which took place in the International Sporting Club, frequently lasted until late in the evening, though fortunately they usually ended in time to allow delegates to take part in the numerous social events which had been arranged for their benefit. Most days there were receptions offered by the Principality or different organisations including one at the Radio Monte Carlo transmitter some 3,000 ft. above the Mediterranean from where, in the cool of the sub-tropical evening (whilst gentlemen in England were huddled round their fires), a magnificent panorama of the Cote d'Azur was obtained (in addition to the generous hospitality of the hosts). The principal social event was the dinner, held on the Thursday evening at the Hotel de Paris, when the brief speeches by the Mayor of Monaco, the President, and M. Lousberg, who spoke on behalf of the foreign visitors, left plenty of time for everyone to have a most enjoyable evening.

Incidentally, each day during the meeting Radio Monte Carlo arranged for the principal authors to broadcast on the day's proceedings. On the Thursday this task fell to Mr. Waldram and M. Vallat. It so happened that the Thursday afternoon session was a prolonged one and these two authors reached the studios just in time, though without time in which to prepare any material. Nevertheless Mr. Waldram was able to compare the differences in street lighting in Great Britain and France and to speak of the progress being made in Great Britain on fluorescent street lighting.

Presidential Address

The first day of business was the Tuesday, when the President, Prof. Yves Le Grand, presented his presidential address. After thanking the Principality of Monaco for extending hospitality to the Association Française des Eclairagistes, he said that it was perhaps something of a paradox that the A.F.E. should come to a place like Monaco to work, but in spite of the many counter-attractions delegates were determined to hear the varied

and attractive papers which had been included in the programme.

M. Le Grand recalled that the theme of the meeting was light and tourisme. Explaining how this theme had been adopted, he said that for a good many years men, or at least those who lived in cities, no longer organised their day by the rising and setting of the sun; so many activities were now carried out by night that man might almost be regarded as a nocturnal animal. The development of electric lighting during the last 75 years had considerably affected our way of life.

In the early days of electric lighting the work of the lighting engineer was comparatively simple; for example, providing better lighting on the roads to enable people to get about without danger from undesirables such as pick-pockets. Nowadays the lighting engineer is concerned with every phase of life and interests himself as much in natural lighting as with artificial lighting. His work is closely affected by trends in architecture, and with the modern tendency to build larger and taller buildings the lighting engineer is faced with many problems which he has yet to solve. It is possible that the next generation will regard our present efforts much as we now regard those of our grandparents; lighting development, in fact, has only just begun. (He pointed out that though man regards himself as a very superior animal, the firefly is a much more efficient producer of light, with an efficiency of 600 lm./w., whilst we humans are still proud that we can obtain 40 to 50 lm./w.)

Whilst our use of light seems to be a reversal of the natural order of things, tourisme is surely something which is quite natural, as it has always been the habit of man to wander about the face of the earth. Tourisme takes a number of forms; the hiker or camper has perhaps little use for light except when he wants to find his way into his tent late at night; at the other extreme there is the example given by the illuminated chateaux of France, which have become such a great attraction to tourists during recent years. The most important use of light from the tourist's point of view is that which enables him to get about by night, whether it be by the headlamps of his car, street lighting or illuminated direction signs. When arriving in a strange town by night how much one's first impression depends on the warmth and welcome given by the lights of the town; on arrival at a hotel one expects a bright and cheerful interior—but how often one has to suffer from being unable to see to read or write, or even to shave oneself. The subject of lighting and tourisme therefore covered a very wide field.

During the course of his address M. Le Grand gave a warm welcome to overseas visitors present at the meeting. Visitors, he said, had come from Belgium, Germany, Great Britain, Holland, Italy, Spain and Switzerland, thereby giving the meeting an international flavour.

In conclusion M. Le Grand said, "On our small planet where so much technical achievement has contributed at one time or another to the destruction of man, where chemistry, aviation and nuclear energy have in turn caused us to have nightmares, lighting and tourisme serve, thank God, no warlike purpose. It is comforting that whilst the diplomats argue indefinitely, each hoping to score off his neighbour, here in this room people from many countries will be discussiong problems which have for their object only the making of life more agreeable for their fellows. Let us hope that our example will be followed and that soon by our efforts and those of all men of goodwill a greater light will illuminate a friendlier and happier world."

Parks and Gardens

After the presidential address the first paper was that by Mr. L. C. Kalff (Holland) on the lighting of parks and gardens. Such places, he said, were lighted with the object of attracting the public; it is necessary therefore not only to achieve beautiful effects but to get effects which can be appreciated when people are gathered together in large crowds, effects which are out of the ordinary, striking contrasts of brightness and colour, silhouettes, reversal of day-time appearance and the use of the element of surprise. In studying the lighting of a park or garden it is essential to remember that the brightness that can be obtained on foliage is necessarily limited; the best chance of success is therefore either in contrasting the foliage against the darker night sky or in leaving it entirely unlighted. Lighting of such places involves not only the plants and trees but the lighting of the footpaths where decorative effects can be used, and lighting for security purposes. As the brightness of plants and foliage is so low it is essential to avoid excess brightness in the field of view whether of objects lighted or by visible light sources which will seriously detract from the desired effect.

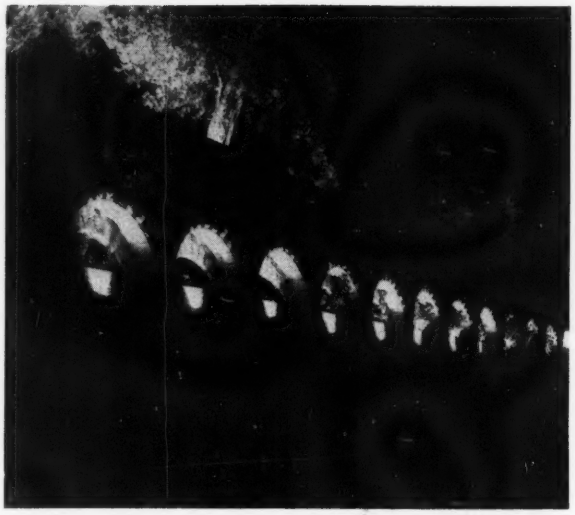
Floodlighting

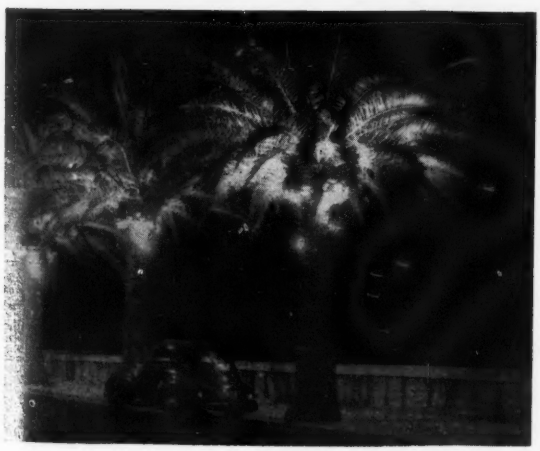
The paper on the Tuesday afternoon was a review of recent progress in floodlighting techniques and was given by M. Georges Leblanc. He said that floodlighting techniques were very similar to those used in the theatre and stage lighting methods were actually being used in connection with the festivals of light and sound now becoming so popular in France. He showed a development of a device for colour change by additive mixture of four colours in which a single "joystick" controller can be moved about within an aperture in a control panel rather like a colour triangle, thereby controlling the output of four coloured light sources by means of resistances. For larger loads thyratron control is possible. Communications on this subject were made by M. L. Gaymard, who referred to the festival at Versailles a report on which appeared in *Light and Lighting*, May, 1954, and by M. Deribere and others.

Night Driving and Headlamps

The subjects for discussion on Wednesday were night driving and vehicle headlights. In the morning M. R. Pages discussed the psychological factors in driving and stressed that research on such matters must be conducted under conditions such as appertain when actually driving. He spoke in detail of the factors affecting reaction time in driving and described some recent experiments on the subject.

The paper in the afternoon was given by M. P. Cibie, who dealt with vehicle headlamps. He pointed out that though headlamps of a stationary vehicle may give a reasonable illumination as much as 250 yards ahead of the vehicle, the useful amount of light can only be judged when the vehicle is on the move, as the speed of the vehicle and the vibration produced when running modify considerably the effectiveness of headlamps. He discussed the problem of meeting beams and described the





Some of the lighting at Monaco:—

Top left: Decorative lighting in the Parc Princesse Antoinette.

Top right: The Casino.

Left: The Palace.

Bottom left: Palm trees on the promenade.

Below: One of the demonstration street lighting installations.

(Photos by Erdé, Monte Carlo)

Top left: *Mr. L. C. Kalff with Prof. Le Grand and other delegates.*

Top right: *Mr. H. G. Campbell, Mr. A. Boereboom (Belgium) and Mr. Baillet (Monaco).*

Centre Left: *Prof. Dejardin with Mr. J. M. Waldram.*

Centre right: *Mr. G. F. Cole, Mr. and Mrs. H. G. Campbell and Mr. J. M. Waldram.*

Below left: *Mr. Jean Chappat with Mrs. Campbell and Sr. Joachim Borrego (Spain).*

American and European systems. He referred to the difficulties of introducing polarised headlights and concluded by saying that, however good headlamps may be, their effective use depends on their being maintained and kept in correct adjustment by vehicle owners.

On the Wednesday evening there was a demonstration of vehicle headlamps on the Quai des Etats-Unis.

Street Lighting

The Thursday morning session was very well attended for the paper on street lighting by Mr. J. M. Waldram. Recent progress in Great Britain was described, and Mr. Waldram briefly referred to the Code of Practice for main road lighting, and said that a similar document for other roads was now being prepared. He showed slides of several interesting installations and mentioned installations in which lanterns have been mounted on to buildings. Dealing with the lighting of tunnels he stressed the importance of inter-reflection within the tunnel, and said that a reduction of reflection factor from 80 to 60 per cent. would mean an increase of 70 per cent. in energy consumption to achieve the same brightness within the tunnel; this showed the importance of using light-coloured surfaces and of keeping them clean. The lighting of the tunnel entrance was a particularly difficult problem, and Mr. Waldram described some recent model studies undertaken to find a means of raising the brightness at the entrance without increasing the glare, thereby reducing the brightness contrast between the interior of the tunnel and the much greater brightness of the exterior daylight.

There were a number of interesting communications on street lighting. M. J. Lillo Orzaes (Spain) said that in Madrid there were large installations of JH-1 h.p.m.v. fluorescent lamps, and reported that lamp lives of 5,000 hours had been reported. M. Richard (Italy) said that there was little money available for street lighting in his country, but then went on to describe a number of modern fluorescent installations, most of which made use of different types of lantern all at very close spacing. Several high-mounted units were shown of various decorative shapes used mainly for the lighting of squares; some of these were similar to recent German designs which have already been described in *Light and Lighting*. M. De Buffevent described in detail the installation on the Route de l'Ouest from Paris via St. Cloud. This road carries very heavy traffic on a double carriageway, each of which is 9 metres wide with a 2-metre central reservation. The lanterns used are of the cut-off type with 250-watt H.P.L. lamps with special aluminium stepped reflectors mounted two on a column on the central reservation at a height of 13 metres at 50-metre spacing. M. A. Dufourq described some installations in Bordeaux. Tests had been carried out on various types of lighting, and in general it had been found that fluorescent h.p.m.v. lamps were cheapest and most suitable. In this case lives as much as 20,000 hours had been reported, though the light output after that time was considerably reduced.

Sports Lighting

On Thursday afternoon the subject for discussion was sports lighting. The main paper was given by M. A. Vallat (Secretary of the A.F.E.). He said that sporting activities were becoming increasingly popular, and the development of lighting techniques now made evening sporting events as much a part of our way of life as the cinema or theatre. Each kind of sport had its own lighting requirements, and he dealt in detail with the specific requirements of many kinds of sports and games.

The paper was followed by two communications, the first of which was given by Mr. G. F. Cole, who spoke on floodlighting for football. He pointed out that in Great Britain floodlit football had a great following, but that it was generally agreed that in order for evening games to retain their present popularity it was desirable that the number of games be kept to a reasonable minimum—in which respect the traditional English weather was perhaps a help, as it was not possible to play night-time games in the middle of the winter. He showed slides of a number of installations, particularly of those at smaller grounds where the lighting problem was frequently more difficult than at the larger grounds. The other communication was given by M. De Lucas Castells (Spain), who described the lighting used for games peculiar to Spain, including bull-fighting.

Fluorescent Lighting

On Friday morning M. Jean Maisonneuve read a paper on fluorescent lighting in which he spoke quite frankly of the criticisms which have been made of the fluorescent lamp in France and of the importance of good lighting design. A year ago the French Academy of Medicine had published a report vindicating fluorescent lamps provided they were properly used. Some of the complaints which had been made about fluorescent lighting were clearly frivolous, and he quoted an old report making almost exactly the same criticism of the "half-watt" lamps as have recently been made about fluorescent lamps. Communications after this paper were made by Prof. Dejardin, of Lyon University, and Dr. R. G. Hopkinson, both of whom have been working on the effects of flicker with fluorescent lighting.

At the last technical session on the Friday afternoon Dr. Merry Cohu gave a paper on the design and testing of fluorescent luminaires in which he dealt in detail with the various factors such as light distribution and brightness of luminaires and the methods adopted in testing the photometric properties of new designs. In a contribution to the discussion Mr. Waldram dealt with the complementary problem of deciding on the performance required of a luminaire and described the new approach to interior lighting design which he recently put forward in a paper to the I.E.S. (Transactions Vol. XIX, No. 4, 1954).

Closing Session

The closing session of the meeting took place on the Saturday morning at the Musée Océanographique in the presence of S.A.S. The Prince of Monaco. At this session a summary on the theme of lighting and tourisme was given by M. Martin-Demezil, who described, with the aid of a coloured film, the importance of tourisme in his own part of France (Loir et Cher) and the maior contribution of the illuminated chateaux of the Loire.

Finally the 1954 meeting of the Association Française des Eclairagistes was brought to a close by Prof. Le Grand, who, in the course of his closing address, expressed the thanks of the Association to visitors from other countries who had contributed communications and who had taken part in discussions.

Annual Meeting of the Lichttechnische Gesellschaft

Prof. L. Schneider, President, LTG

The annual meeting of the LTG, held this year at the Berlin Technical University from the 24th to the 26th of March, was an outstanding success. About 600 scientists and illuminating engineers from all parts of Germany, as well as visitors from Austria, France, the Netherlands, Norway and Sweden were present.

Berlin was chosen as the venue because of its long-standing importance in the field of illuminating engineering. J. H. Lambert, the author of "Photometria" (published in 1760) worked here during the eighteenth century, while in later years Helmholtz, Hefner-Alteneck and Planck all pursued their researches in Berlin. The Physikalisch-Technische Reichsanstalt (PTR) was established here and under Lummer, Brodhun and Liebenthal photometric methods and instruments were developed. In 1912 the Deutsche Beleuchtungstechnische Gesellschaft (DBG), the predecessor of the LTG, was formed in Berlin.

At the opening session, held in the Large Physics Theatre, the President of the LTG, Prof. L. Schneider, welcomed the members and expressed the pleasure of the Society at seeing so many visitors from overseas. He also welcomed representatives of the Government, of the Civic authorities of Berlin, of many German universities and colleges for technological education, and of other scientific and technical societies.

The Senator for Popular Culture, Prof. Tiburtius, welcomed the members on behalf of the Mayor of Berlin and of the Senate, Dr. Stransky conveyed greetings from the Rector and Senate of the Technical University, while Prof. Riepe, in the name of the Union of Technical and Scientific Associations, expressed good wishes for the success of the meeting.

Dr. H. Korte, a member of the Physikalisch-Technische Bundesanstalt at Brunswick, and well known to many readers of *Light and Lighting* who have attended meetings of the CIE, then gave the opening discourse on "Light in Physics and Illuminating Engineering." To the illuminating engineer, he said, light was electromagnetic radiation within the visible spectrum. The physicist, on the other hand, spoke of ultra-violet and infra-red light and of Röntgen light. That was legitimate because there was nothing special, physically, about the visible range. The eye was a quite unsuitable instrument for the study of physical phenomena. Modern physics would be unaffected even if man was unable by means of his eyes, to appreciate the world around him. Illuminating engineering, on the other hand, could only exist so long as man remained a seeing animal and was able to develop artificial sources of light. The electromagnetic spectrum, said Dr. Korte, covered some 50 octaves while the visible range was of one octave only, yet this fiftieth of the whole had not only made possible, but in fact had created a complete technology. In illuminating engineering the physiological function V_λ was of the greatest importance and the development of physicial methods of measurement depending on V_λ would, he said, become more and more general.

Brightness Engineering and Other Matters

There were four papers on the programme for the morning of the second day, but before these were presented M. Chappat conveyed to the LTG the greetings of the Association Française des Eclairagistes and its President, Prof. Le Grand.

Dr. W. Arndt then read his paper entitled "The Practice and Possibilities of Brightness Engineering." He reviewed the work which had been done on the subject in America and elsewhere, particularly that of Logan, Harrison and Meaker, and Luckiesh and Guth. He said that the chief factor in determining our judgment as to the acceptability of a lighting installation was the brightness of what he called the "lighting centre of gravity" in the field of view. In daylight this was the window, at night it was the lighting fitting and neither of these should produce glare. He went on to discuss the use of glare factors and described the "interflection" method of lighting design. (This paper is published in full in the May, 1954, issue of *Lichttechnik*.)

The next paper was by Prof. H. J. Helwig, who

Some of the speakers at the LTG meeting in Berlin:

Left: Prof. Dr. H. J. Helwig.

Centre: Prof. Dr. R. Schulze.

Right: Dr. H. Korte.

described research on the development of light sources. The greater part of his paper was devoted to recent improvements in the filament lamp, in particular the use of an internal diffusing coating of silica, the use of silicones for cementing caps, and a new kind of current bridge which, when lamps were operated in series, prevented the failure of one lamp from putting the whole group out of action. He also described modern forms of reflector lamps and of rough-service lamps and he mentioned the electronic flash lamp. In fluorescent lamps the chief advances, he said, had been in methods of starting. He described the U-shaped lamps rated at 16 and 40 watts and referred to the problems involved in using fluorescent lamps in situations where explosive gas mixtures were prevalent.

In the third paper, entitled "The Biological Effects of Light and Radiation," Prof. R. Schulze introduced his audience to a world which was comparatively unfamiliar to many of them. He described the various forms of radiation to which living organisms were subjected and to which they had perforce to adapt themselves in the course of their life cycles. Part of this radiation helped biological development, another part assisted to maintain a proper energy balance, while a third apparently served as a biological stimulant. This paper, too, is to appear in a future number of *Lichttechnik*.

The morning session closed with a very entertaining experimental discourse by Dr. P. Brauer on the subject of the "Physics and Chemistry of Phosphors." He first explained the conditions necessary for the production of luminescence and, after mentioning some naturally occurring phosphors, described the artificially created phosphors and their properties. Then came a discussion of phosphors as energy transformers, a description of the chemistry of the inorganic phosphors and of activators and finally a physical picture of the mechanism of fluorescence. The lecture was illustrated throughout with a wealth of demonstration material and was greatly appreciated by the large audience present.

In the afternoon there were again four papers on the programme, but these were presented in parallel sessions so as to provide more time for the respective authors. Dr. P. Grosskurth, of the West German Railways, spoke of gas lamps for signalling purposes. Petroleum lamps, he said, were still extensively used, but required a great deal of attention. Of the liquefied gases, by far the most convenient was propane because it could be liquefied at a comparatively low pressure while at the same time the vapour pressure, even at very low temperatures, was sufficient to ensure reliable operation. The lamps used on the railways would operate continuously for from two to six weeks according to the size of the gas container. Lights used as aids to marine navigation could be run for 12 months without renewal. A special design of lantern was needed for the efficient removal of the products of combustion.

Prof. Arndt with Jean Maisonneuve and Jean Chappat of Paris.

Dr. J. Rieck gave a paper entitled "Infra-red Kinematography in Twilight and Darkness," in which he explained how photography, including kinematography, could be carried out under very poor lighting conditions, or even in the dark, by the use of infra-red lighting. This method, he said, was of special value in scientific

kinematography, where it was often the only way in which photography was at all possible. The "illumination" was provided by a projector or flash tube with a special infra-red transmitting filter. Ordinary cameras and projection apparatus could be used. Dr. Rieck showed a number of examples of films taken by this method in circumstances in which ordinary photography would have been quite impossible.

Up-to-date Lighting with Fluorescent Lamps

Dr. D. Fischer gave an interesting lecture on "A New Outlook in the Art of Room Lighting." He said that in purely functional lighting the engineering outlook was predominant, but for rooms such as living-rooms the emphasis tended to shift to the aesthetics of the subject. While tungsten lamps were well suited to ornamental fittings, the fluorescent lamp, with its long tubular form, needed concealment in built-in features. Fluorescent lighting might provide a very good and uniform illumination, but it could easily create a somewhat depressing atmosphere which was not fully compensated by the feeling of comfort created. Some focal points and a deliberately created accent were needed.

The difficult subject of light-field theory was discussed by Mr. J. K. Krochmann. He explained that the basic quantities in this theory were the total flux density at a point and the illumination vector. The former was the total flux entering a sphere of unit radius having the point as centre. The latter gave the maximum resultant illumination at the point, both in magnitude and direction. Arndt and Dresler, he said, had developed a method of assessing the quality of a lighting system on the basis of the total flux density.

The session on the morning of March 26 opened with a paper by Dr. H. Schober on the vexed question of "The Alleged Visual Disabilities under Fluorescent Lighting." Dr. Schober, who spoke both as a medical man and as an illuminating engineer, said that the spread of fluorescent lighting had been accompanied by complaints of various drawbacks to seeing which were experienced by users. These complaints referred to a number of alleged effects, and they followed much the same pattern in all countries. A number of researches had been carried out in an attempt to elucidate the causes of trouble. One of these was certainly bad design of the lighting system. Others were matters of social hygiene, such as the extension of night work. There was no doubt that conjunctival troubles could *not* be attributed to the light from the lamps.

Colour Rendering

Prof. M. Richter, one of the chief exponents of colour science in Germany, gave a paper on "The Evaluation of Colour Rendering with the DIN Colour Atlas." This atlas or colour chart (DIN 6164) was prepared to assist in the specification of colours, and it could be applied to the assessment of the colour-rendering properties of an illuminant. Dr. Richter explained the basis of the system and showed how it could be used to detect the colour distortion or the shift of colours produced by a given illuminant as compared with a standard illuminant.

The final paper was by Dr. K. Larché, who spoke "On the Possibilities and Limitations of Light Production by means of the Xenon High Pressure Lamp." This lamp, he said, had very good colour rendering properties, and in consequence lamps of high watt rating had been developed. There were now air-cooled lamps taking from 160 to 2,000 watts and water-cooled lamps up to 6 kw. The air-cooled range was about to be extended to 4 kw. and a water-cooled lamp taking 20 kw. was contemplated. Much experimental work, he said, had been done on both the electrical and the radiation characteristics of the xenon lamp, and it was possible to design such a lamp to operate directly off the mains.

In the afternoon there was a general meeting of the LTG, at which the chief business was the election of a new President to succeed Prof. Schneider, who did not wish to continue in office. The choice fell on Prof. P. Schulz, the Director of the Lighting Institute at the Karlsruhe College of Technology. Meetings are to be held in future every two years, and the meeting place for the next occasion will be Essen.

Before the LTG meeting there was a session of the Illumination Section of the German Standards Association (corresponding to the Illumination Industry Committee of the B.S.I.). The chairmen of the different specialised committees reported on the work of their committees and matters of organisation were discussed.

One of the benefits of a Congress Meeting like that which has just been described is the opportunity it provides for personal contacts on a quite informal basis between those who have common technical interests. A focus for this social side of the meeting was provided on the Thursday evening when an informal dance and cabaret were held in the Funkturm Casino. Most of those who attended the meetings were present with their ladies, and the success of the evening amply justified the hard work which had been put into the arrangements by local members of the LTG.

I.E.S. Summer Meeting, Southport

(Continued from page 229)

sentation of the display, and Mr. A. H. Nash, who had made all the detailed arrangements. Thanks were also expressed to the firms who had permitted visits to their factories during the meeting and to the Architects Department of the Lancashire County Council and Mr. Grenfell Baines, who had arranged the visits to the schools.

The President said that the Society had been particularly pleased to welcome so many visitors from overseas, and Mr. Van der Molen, of Holland, on behalf of the overseas visitors, expressed sincere thanks for the hospitality that had been extended to them and for the good fellowship which they had enjoyed.

Finally Mr. Sawyer moved a vote of thanks to the Summer Meeting committee for what he described as one of the most successful functions ever organised by the Society.

Dow Golf Cup

During the summer meeting a competition was played for the Dow Golf Cup. Rounds were played at the Southport and Ainsdale course. The cup was won by Mr. G. A. Baker, of Sangamo Weston Ltd., a member of the Liverpool Centre of the I.E.S.

Lighting Abstracts

LAMPS AND FITTINGS

63. Starting of fluorescent tubes. 621.327.43

S. WRETEMARK. *Ljuskultur*, **26**, 19-22 (*No.* 1, 1954). *In Swedish.*

Discusses problems arising in the starting of hot-cathode fluorescent tubes. Methods of eliminating starting difficulties due to low temperature or high humidity conditions are discussed, and new quick-start lamps are described.

R. G. H.

621.327.4

64. New ultra-violet radiator unit with high pressure xenon lamp.

J. KERN. *Lichttechnik*, **6**, 181-183 (*May*, 1954). *In German.*

The ordinary high-pressure xenon lamp operates at a gas pressure of some 20 atmospheres and is therefore unsuitable for u.v. therapy. A lamp has been specially designed to operate at much lower pressures. It takes 900 watts and gives a continuous spectrum in the u.v. similar to that of sunlight. During operation the arc length is 12 cm. and an electro-magnetic device is provided to enable the arc to be struck without the use of a special starter. The lamp gives about the same amount of u.v. as a 180-watt therapeutic h.p.m.v. lamp. J. W. T. W.

LIGHTING

65. Measured utilisation factors. 628.93

W. M. POTTER AND A. H. RUSSELL. *Illum. Engng.*, **49**, 137-147 (*March*, 1954).

Reports measurements which have been made of the utilisation factors of a number of direct and indirect lighting installations, the former employing fittings with narrow, medium and wide flux distributions. These measurements have been compared with values obtained from the Harrison-Anderson data and from zonal-interflection calculations. A new concept of flux ratio is proposed which gives more satisfactory values of utilisation factor for installations employing fittings having narrow beam distributions than does the current concept. P. P.

66. Functional top lighting with glass block. 628.92

H. F. KINGSBURY, W. H. BILLHARTZ and R. W. MCKINLEY. *Illum. Engng.*, **49**, 185-187 (*April*, 1954).

Describes a method for the daylighting of building interiors by using rooflights glazed with glass blocks. The blocks are 12 in. square and have etched-glass faces and an interposed fibrous glass screen. Comparisons are made between calculations and measurements of the illuminations and luminances obtained with this method of fenestration.

P. P.

67. School lighting and posture. 628.972

W. ALLPHIN. *Illum. Engng.*, **49**, 192-196 (*April*, 1954).

Unposed photographs taken in a school are used to study the postures assumed by children when writing. In general there appears to be no connection between illumination level and posture. Specifically, schoolchildren do not adjust their posture to avoid or reduce the glare from windows. Posture is governed to a large extent by the hand being use for writing, a right-handed children tilting to the left and vice versa. P. P.

68. Route de l'Ouest. **628.971.6**

M. CANDAU. *Lux*, **22**, 16-18 (*Jan.-Apl.*, 1954).

The Route de l'Ouest carries very heavy and increasing traffic from St. Cloud Tunnel westwards. It is a double carriageway road, with carriageways 9 m. wide, a central reservation 2 m. wide and margins 3.5 m. wide. The new lighting is by a cut-off system mounted on the reservation. The mounting height is 13 m. (40 ft.) and the spacing 51 m. (170 ft.), and each unit consists of two 250-watt cut-off lanterns, with h.p.l. (h.p.m.v. fluorescent) lamps. The lanterns are formed rather like a deep r.l.m. reflector with a tall conical finial, and have in the skirt of the hood two stepped mirrors of aluminium, electrolytically brightened and anodised. The polar curve shows a maximum at 60 deg. from the downward vertical, and a cut-off which is nearly complete by 80 deg.; the two beams are 11 deg. non-axial. An architect has designed the column and bracket, the shafts being of sheet metal and not tapered, and the brackets of steel tube curiously cranked. The mean illumination is 7 lux (0.7 lm./ft.^{2}) with a diversity of 3 : 1 maximum. J. M. W.

69. Home lighting through the ages. 628.972

K. HOLMGVIST. *Ljuskultur*, **26**, 3-6 (*No.* 1, 1954). *In Swedish.*

Describes with photographs, an exhibition of home lighting held in the Nordic Museum at Stockholm. Decorative designs of different periods are illustrated, including the great eighteenth-century period of candelabra design and the later attempts to make an acceptable object of a paraffin lamp. Modern design is represented by Asplund's fitting designed in 1922, which, together with its successors, became popular in Sweden in the 1930's and is now influencing design elsewhere. R. G. H.

70. Glareless street lighting. 628.971.6

K. WILD. *Lichttechnik*, **6**, 130-132 (*Apr.*, 1954). *In German.*

The author has investigated theoretically the use of louvre fluorescent fittings for street lighting, the fittings being centrally suspended and arranged longitudinally so that the lamps are entirely shielded from the view of anyone looking down the street. He has calculated the loss of light with various spacings and depths of screen and gives values for the corresponding diversity factors of the illumination at the street surface. In wet weather the street surface would appear very dark owing to the absence of streaks of reflected light. J. W. T. W.

628.971.6

71. Model investigation of the problem of longitudinal or crosswise suspension of fluorescent street lighting fittings.

E. HALLIER. *Lichttechnik*, **6**, 128-130 (*Apr.*, 1954). *In German.*

The author set up a model street on a scale of 1 in 35. It consisted of a box 84 cm. long with mirrors at the ends and fittings were suspended centrally, the height and spacing represented being 10 m. and 33 m. respectively. A camera was placed at one end of the box in a position representing the eye of a driver and photographs were taken with fittings, correctly scaled, arranged (a) longitudinally, and (b) across the street. The street surface was represented by fine sand-paper, and in one series of experiments the sides of the box were black while in the other they were covered with a simulation of building fronts. Comparison of the photographs taken under the two arrangements (a) and (b) showed that the crosswise arrangement was markedly superior. J. W. T. W.

Correspondence

Flameproof Lighting Equipment

To the Editor, LIGHT AND LIGHTING.

Dear Sir,—The discussion of Mr. Strachan's paper (Transactions I.E.S., **19**, 169 (1954)) reveals a curious state of affairs in the specification of flameproof equipment. Mr. Strachan discusses the action of the gap in preventing ignition of surrounding atmospheres — a matter on which there is clearly no complete understanding yet—and quotes the official requirements for maximum gap width for various classes of inflammable gases and vapours in much detail. Mr. Mann in the discussion gives more detailed information of the determinations of safety gap width, but it appears that (1) the fitting is strong enough to withstand an unrelieved internal explosion, (2) the gap is not relied upon to relieve the pressure within the fitting, (3) such a gap could not relieve transient pressures in any case, and (4) in testing, the flanges are pulled up solid. So what do we want a gap for?—Yours, etc.,

J. M. WALDRAM.

Wembley.

To the Editor, LIGHT AND LIGHTING.

Dear Sir,—I have had the opportunity of seeing a copy of Mr. Waldram's letter which appears in this issue and thought it would be useful if a reply could be printed at the same time.

The answer to Mr. Waldram's last question is quite straightforward—we *don't* want flange gaps in a flameproof enclosure, but how can they be avoided. For example, there must be provision in a flameproof motor for the shaft to be brought out from the enclosure; in a flameproof switch there must be provision for the spindle to be brought out through the wall of the enclosure and in a flameproof lighting fitting there must be facilities for changing the lamp. It is therefore evident that some form of flange or sleeve joint(s) must be an accepted part of the design of any flameproof electrical apparatus. This being so, the minimum breadth of flange and maximum permissible width of gap are those demanded by B.S.229.

As stated in my recent paper on this subject, the basic protection afforded by the specification of gap and flange dimensions relates *not* to the relief of the pressure within the enclosure (which is made sufficiently strong to withstand a severe internal explosion) but to ensure that the flame generated by an internal explosion will not ignite an external inflammable atmosphere.

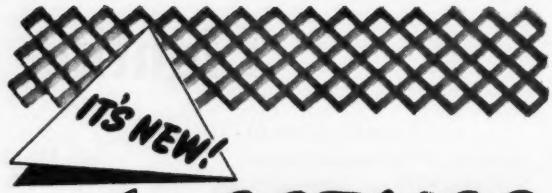
With regard to the flanges, B.S.229 requires that all joints in a flameproof enclosure shall fit as closely as the method of manufacture permits, but in no case shall the gaps exceed the limits specified for the particular inflammable gas or vapour in which the equipment is to be used.

I hope this rather brief reply will help to clarify the position.—Yours, etc.,

D. A. STRACHAN.

London.

The Gold Medal awarded each year by the American I.E.S. is this year to be given to Dr. E. F. Lowry, of Sylvania Electric Products. Presentation of the medal will be made at the Society's National Technical Conference which begins at Atlantic City on September 13. Dr. Lowry has specialised on phosphors and cathodes for fluorescent lighting.



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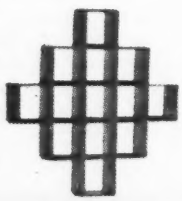

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Personal

MR. V.C. H. CREER, of The British Thomson-Houston Co., Ltd., has been elected Chairman of Electric Lamp Manufacturers' Association for the year commencing June 1, 1954.

Siemens Electric Lamps and Supplies Ltd. announce the retirement of MR. C. M. JOHNSON, Area Manager of Siemens Belfast Branch, as from May 31. He joined the Britannia Lamp and Accessories Co. in 1917, and when in 1920 this company was absorbed in the Siemens Organisation, he was transferred to Siemens Electric Lamps and Supplies Ltd. MR. G. N. ARMSTRONG has been appointed Area Manager, Belfast in place of MR. JOHNSON, whose services will still be available in an advisory capacity.

Siemens Electric Lamps and Supplies Ltd. also announce the retirement of MR. E. A. ATKINS, Area Manager for their Cardiff Branch. He joined Siemens Brothers Co., Ltd., in June, 1908, and was transferred to Siemens Electric Lamps and Supplies Ltd. in 1931. He went to Cardiff as Branch Manager in 1948. MR. W. A. COOPER has been appointed Area Manager for Cardiff as from June 1, 1954.

MR. J. H. CHRISTIE, formerly of Lawson Turnbull Ltd., Electrical Wholesalers, of Aberdeen, took up his appointment as Lamp Salesman with The British Thomson-Houston Co., Ltd., at Dundee on June 1.

EKCO-ENSIGN ELECTRIC LTD. announce the recent appointment of Mr. C. H. Dunkley as their representative covering the London postal districts of W.1 and W.C.1. He will operate from the company's Southern Sales Office at 45, Essex Street, Strand, London, W.C.2. They have also recently appointed MR. J. A. HATTO as their representative covering the county of Derbyshire and part of Nottinghamshire. He will operate from the company's East Midlands Sales Office at 57, Hounds Gate, Nottingham.

Smart and Brown (Engineers) Ltd., are pleased to announce that MR. C. A. PATTERSON has joined their Technical Sales Department as a Lighting Engineer. He was previously with Benjamin Electric Ltd.

MR. W. H. WILLIAMS, a Director of The General Electric Co., Ltd., and Manager of the Osram Lamp Department, retired on June 30. He has, however, agreed to be retained in an advisory capacity for a further period of six months until December 31.

MR. A. E. PAGE who joined the company in 1915, was appointed Assistant Sales Manager of Osram Lamp Department in 1930 and Sales Manager in 1946, took over the full management of the Department on July 1.

Trade Notes

SCEMCO, LTD., have placed on the market a new plastic louvering made up from multiples of a section $5\frac{3}{8}$ in. x $5\frac{3}{8}$ in. (with squares $1\frac{1}{2}$ in. square x 1 in. deep) and sealed together by a special chemical process. It can be constructed to any size and is designed for fixing under fluorescent lamps and control gear. There is no limit to ceiling dimensions and the louvering can be cut to any shape to allow for pillars and odd shaped corners. There is no extra charge for sealing the pieces together or cutting. Clients need send only actual measurements and quotations are dispatched within 24 hours. Delivery is 14 days.

THORN ELECTRICAL INDUSTRIES, LTD., announce that the Midlands' Sales Office of the "Atlas" Lighting Division has moved to new premises at 23, Sheepcote Street, Birmingham, 15. Telephone: Birmingham Midland 5291.

BRITISH THOMSON-HOUSTON CO., LTD., Lamp and Lighting Depot at Edinburgh moved to new premises at 12, Thistle Street, Edinburgh, 2 on June 28. The telephone number remains unchanged—CEN 6922.

Trade Literature

THE EDISON SWAN ELECTRIC CO., LTD., 155, Charing Cross Road, W.C.2.—A catalogue listing, with individual reference numbers, each type of C.M.A. cable and flexible cord. Well illustrated with prices.

FALK, STADELMANN AND CO., LTD., 91, Farringdon Road, E.C.1.—Publication No. 801/54 illustrating a range of luminaires to meet lighting requirements of offices, schools, hospitals and public buildings. Each luminaire is illustrated, detailed and priced.

KNIGHTSHADES, LTD., Derby Road Works, Montagu Road, Edmonton, N.18.—List No. 58 showing a wide range of entirely new designs for table lamps, lampshades and decorative luminaires, including details and prices.

SIEMENS ELECTRIC LAMPS AND SUPPLIES, LTD., 38-39, Upper Thames Street, E.C. 4.—Leaflet No. 109/54 giving details and prices of their new spotlight and floodlight fitting for shop and store display. Also released is Leaflet No. 107/54 on Siemens "Newlyte" consumers' service unit, both metal clad and insulated patterns

TUCKER AND EDGAR, Berkley Road, N.W.1.—Fully illustrated brochure of recent "Teeanee" luminaires and fixtures.

Situations Vacant

British Railways have vacancy in Lighting Section at Euston for DRAUGHTSMAN capable of preparing schemes for interior and exterior lighting. Maximum salary range at 36 years is £607 10s. per annum; opportunities for promotion. Residential and other travelling facilities available. Applications with details of experience to Civil Engineer, British Railways (LMR), Euston Grove, N.W.1.

COMMERCIAL ASSISTANT wanted by leading manufacturer to deal with tenders and correspondence connected with electric street lighting. Office Central London. Previous experience an advantage, but not essential. Excellent prospects. Pension scheme.—Write, giving full particulars and salary required, Box No. 861.

Experienced DESIGNER of decorative electric lighting fittings wanted by leading manufacturer (Central London). —Write, stating experience and salary required, Box No. 862.

POSTSCRIPT By "Lumeritas"

I visited the Production Exhibition, held at Olympia, London, from July 7 to 14, and while there was much of interest to me the extremely scanty treatment of lighting in relation to production caused me considerable surprise. The lighting industry made no show at all except for an exhibit by a very well-known firm of building contractors who for some years have operated a specialist service for the design of colour schemes and lighting installations. The subject of their exhibit was the scientific approach to the lighting and decoration of factory interiors and equipment in the interests of higher occupational efficiency. A pictorial display illustrated the principles involved and the benefits to be derived from good lighting and colour treatment, and the exhibit included a prototype of a new fluorescent luminaire. The luminaire is simple and versatile; it can be used for direct or indirect lighting; it can be pendent or mounted directly on wall or ceiling; it can be angled, and it has variable cut-off from 20 deg. to 35 deg. No doubt it will soon be advertised when readers will be able to see what it looks like and how it is designed. The only other exhibit dealing with lighting was to be found on the stand of the British Electrical Development Association. Here the importance of good lighting was proclaimed to the accompaniment of a light meter, lamps and photographs of good industrial installations. This was, of course, only a small section of the E.D.A. exhibit and there were other stands, such as those of the Ministry of Labour, the Ministry of Works, Rospa, the production engineers and other professional organisations, where I expected, but looked in vain for, some notice of lighting as a production aid. Perhaps the best lighting for production is now so universally provided that there is no need to make a point of it in an exhibition of this kind; if so the lighting revolution in industry has been more complete than I would have supposed.

Last month I commented on an American paper concerned with some effects of school lighting. The regulations relating to school lighting, which are made by our own Minister of Education, have been revised this year, and they were recently the subject of questions in the House. The Minister was asked how many of her officials are employed in administering her requirements for illumination in school classrooms and what instruments are used for measuring the illumination actually provided. From the Minister's reply it appears that enforcement of the regulations devolves upon local education authorities, and that if exact measurements of the illumination in a particular school are required the Minister of Education arranges for them to be made by the Building Research Station of the D.S.I.R. It is not clear how compliance or non-compliance with the regulations is ascertained without measurements of illumination, yet the Minister's reply suggests that measurement is the exception rather than the rule, for if it were not so surely a department which exists for research would be over-burdened with a duty usually done by an inspectorate, as e.g., in the case of factories. Do local education authorities have no photometers and no one able to use them? Incidentally, the M.P. who raised the question of administering the regulations relating to school lighting objected to the technical terminology used in these regulations. It is understandable that, as a layman, he should be unfamiliar with the names of lighting quantities, and definitions extracted from B.S.233 can hardly be expected to be as lucid to him as they may be to the photometrist. However, the "plain English" alternative regulation he suggested—namely, that the lighting should be such as seems reasonable for the purpose in the opinion of the head teacher or of H.M. Inspectors—is naïve.

This is the holiday season when even those who do not use them in the course of business get acquainted with hotels and enjoy, or suffer, their amenities. The lighting of hotel bedrooms is very seldom all it might be and is often singularly bad. The chief fault is in the relation of light sources—whether "natural" or artificial—to mirrors and especially to the mirror before which the mere male occupant of the room must endeavour to remove his face fungus without drawing blood. This mirror seems almost invariably to be located in the corner of the room where the window-light available for illuminating the hirsute face is least and often, too, where it mirrors the artificial light source better than it does the aforesaid face. There seems generally to be some relation between the number of light sources in a hotel bedroom and the price which the occupant pays, but even when a source is provided for the supposed convenience of the shaver it is not often most suitably placed. It is a sorry fact, however, that hoteliers are not alone in failing to provide good lighting for mirror-viewing: the occupant of the "Englishman's castle" is often similarly at fault and so cheerfully accepts, in his holiday hotel, lighting that is no worse than he puts up with at home.

In the report of the Road Research Board for the year 1953, which was published recently by H.M. Stationery Office, it is said that a "glaremeter" has now been developed at the Road Research Laboratory "to replace, by measurements of light intensity, the subjective judgments which formed the basis of earlier dazzle surveys. . . . The glaremeter consists essentially of a photoelectric cell and recording gear sufficiently sensitive to respond to the light from a dipped beam at 300 ft." In the issue of this journal for November, 1930, a glaremeter designed by Dr. W. S. Stiles was illustrated and described. This instrument, however, was designed to measure the brightness difference threshold as an index of the visual disability caused by glare, whereas what is measured by the R.R.L. glaremeter is the illumination at the eye of an observer exposed to a dazzling light source. The work of the Road Research Laboratory so far indicates that severe dazzle was experienced when the intensity directed at a driver 300 ft. away from the lights of an oncoming vehicle exceeded about 4,000 candelas.